SCINCE FOR VILLAGERS
Vol 5 Nov. -July (1981-1982)
NUTRITION NEWS

HC 444

SCIENCE FOR VILLAGES

VOL. V, No.2

Nov. 1981

PLOUGHING THE FIELD OF RURAL TECHNOLOGY

Due to the process of urban industrialisation, the villages have been reduced to primary producers of raw materials. Whatever little rural industries existed there earlier have evaporated leaving them with only agriculture as the only stay. To develop rural areas, we will have to bring in new technologies which will give them occupations for production of finished goods so as to fill up the gap between the rural and urban which has been increasing with time. Basically, rural industrialisation would have the following dimensions:

(i) Resustication of already existing traditional arts in the villages by impregnating them with new technology and giving them a form that will be more stable in the present age.

(ii) Utilisation of such raw materials available in the villages which are not being used for processing in the village itself.

(iii) Non-traditional and new kinds of techniques which can be based in the villages and which will give fresh avenues of employment to the work-starved people and produce goods which can be utilised in the vicinity or sent to the urban sector bringing investible money in the rural economy.

Amongst these, in the first kind of industries, are those under aegies of the Khadi & V. I. Commission. The second kind will be o a type higher than the existing older village industries pattern and will be much smaller than that utilised at the level of urban industrial complexes. This kind of activity needs miniatucization of sophisticiated big industries, innovation of appropriate techniques and upgrading of existing small techniques. The third kind of techniques termed as 'new' are being developed by various CSIR laboratories and other S & T institutions.

Unless the new techniques known as viable are converted into a form the village people can make use of it, these remain as the study of the generating institution for years together. For appropriate technologies to be translated into trades, much work requires to be done because not only their technological viability has to be proven in the field, their sociological acceptance and economic profitability is also to be establisbed.

However, before industrialisation of any kind is attempted, the most important area we have to address ourselves to is the poorest class. Here we find that occupations as are able to provide assistance to this class must not all be necessarily twelve months job as they will require greater infrastructure and capital. They could also be part time or seasonal industries which the poor can work on during their lay-off days from agricultural work. Such industries supplement the poor man's income by giving him more income days and pave the way towards quantum jump in his position, when in due course he will be able to have an opportunity for a higher-income-level industry. Examples of such industries are: the application of CFTRI techniques in post harvest technology, making soak pits, etc. Such seasonal occupations will go a long way in increasing the per capita income of the poorest starata and bring them above the level demarcated as the poverty line. The analogy of boats that can carry on in shallow waters is apt with such industries which can be plied by people with very shallow money support. The charkha of Gandhi symbolised this baseline programme of succour to lowliest and lost. The poorman's occupations will provide the ploughing of the field of rural economy but the crop of industrialization can be grown on it too.

Devendra Kumar

from the labs

In this column, we invite techniques evolved in the labs of India as can benefit the villages and help in creating a new order.

Portable Gobar Gas Plant Development: M/s. Atreya Engineering Industries Pvt. Ltd., B-34, Badlapur Industrial area, P. O. Kulgaon, Ulhasnagar Taluka, Thane District - 421 503 has developed a ready-to instal portable gobar gas plant using advanced plastics technology. The plant is non-corrodable and needs practically no maintenance. It can be installed by a village handyman and operated by women and children. It is claimed that this plant would give the rated output even during seasons of poor sunshine like the monsoon. It is ideally suited for a family of five-six persons if 30-40 Kgs. of wet dung is available daily to feed the plant. The gas output is 1.5 cu. mtrs. a day and meets the cooking requirements of the family totally. The plant also produces 30-35 kgs. of ready-to-use fertilizer of high nitrogen content daily wich is estimated to be adequate for a four acres farm throughout the year.

Schmoo: The Divine Tree: Schmoo tree grows to a height of 65 ft. in five years in the poorest soil. Its leaves and tender pods can be used as vegetables: its seeds can be ground and the flour used for making bread. Vietnamese use the leaves for preparing curry or sauce and the tender pods, for making candy. Schmoo, harvested each year from one hectare of land contains 2500 kg. of potassium as well as calcium and other minerals. A kilo of its dry wood produces 4640 calories of heat. One kilogram of its charcoal generates 7000 calories of heat which is 70 percent of the heat given by fuel oil. Those who want to try, will be supplied with five seeds free of cost, if they send a self-addressed unstamped envelope and one rupee (to cover the postage and cost of pamphlets) to Shri Nautamlal C. Tejpa, College Wadi, Rajkot - 360 001.

CSIO Develops Fresnel Lens Technology: The Central Scientific Instruments Organisation (CSIO), Chandigarh, has developed a technology for the production of Fresnel Lens. The most important application of Fresnel lenses is as a solar energy concentrator. In conjunction with the solar cell, it converts solar radiations into electrical energy and thus forms a complete solar panel capable of harnessing solar energy for industrial commercial uses.

A Novel Method Of Printing On Leathers: Using half-tone blocks, scientists at the Central Leather Research Institute, Madras, have developed a simple and novel method, called 'Novotone', for printing various designs and patterns on grain side of leather. The technique, developed for the utilisation of hides and skins with grain or other defects, consists of making a photographic print (actual size) of the selected grain pattern of design and preparing a half-tone block and printing the design on a suitably finished leather. The technique is simple in operation and does not require any elaborate equipment or machinery. A small-scale leather goods maker himself can print the patterns on cut panels or components. The investment on equipment being very small, the Novotone technique is ideal for adoption by cottage scale and rural leather goods manufacturing units.

Four-Crop Sequence Found Rewarding: Dr. S. P. Palaniappan conducted experiments with the objective of increasing the cropping intensity on garden lands, selecting a cropping sequence which will give higher economic return than by the existing sequence adopted by farmers and saving fertiliser NPK application to the cropping systems. His experiments resulted in the highest income to the garden land farmers of Coimbatore region from four-crop sequence of sorghum mixed with green gram, cotton, inter-cropped with onion, radish and the fourth crop of black gram.

LIMSU: A New Name for L. P.: RRL, Jammu has conducted extensive studies to find the suitability of clays available in the state of J & K for lime pozzolana cement. Its crushing strength is well over the strength prescribed by the standard IS 1727. The optimum temperature and other parameters of calcination and its pulverisation have also been worked out. Five tonnes of Lime Pozzolana Cement named 'LIMSU' has been produced and tested in various construction activities like stone masonry, wall plastering and road pavement works. The results are quite satisfactory. This cement imparts many other beneficial properties such as better cohesivity, reduced bleeding, less heat evolution, less leaching of lime, reduction in water permeability and better resistance to chemical reactions, and hence, may be preferred in mass concrete works, marine construction and pavement work.

R & D from CSMCRI: The Central Salt and Marine Chemicals Research Institute (CSMCRI), Bhavnagar, has developed know-how for seaweed chemicals such as alginic acid, agar-agar, agarose, etc. Seaweeds have also shown to be potential source for antibiotics. Department of Science and Technology has sponsored projects for cattle-feed, poultry feed, energy and fertilizer from seaweeds. Biogas plant using waste seaweeds has also been developed. Survey and cultivation of economic seaweeds are on the regular programme of the Institute. Two field stations, one each at Mandapam and Okha are pursuing this work.

THE TREASURE

[We are herewith publishing a part of the list of periodicals received regularly by C. S. V. These publications brought out by groups, large or small, scattered throughout the world give an account of new ideas and efforts in various fields, directed towards evolving a new world order based on peace and non-violence. We hope it would be of immense help to our readers.]

1. The Adobe News, P. O. Box 702, Los Lunas, NM 87031, U. S. A. 2. Alternative Sources of Energy, Rt. 2 Box 90A, Milaca, MN 56353, U. S. A. 3. Alternative Perspectives on Society aud Environment, Irail College, Trent University, Peterborough, Ontario K9J 7B8. Canada. 4. Applied Ecology : Abstract. 1 Talconberg Court, London, W1V 5FG. England. 5. Architectural Design, 26, Bloomsbury Way, London WC1. England. 6. Canadian Information Sharing Service, CISS. 121, Avenue Road, Toronto M5R 2G3, Ontario, Canada. 7. Coevolution Quarterly, Stewart Brand Editor, P. O. Box. 428, Sausalito, CA 94965. U. S. A. 8. Compost Science: Journal of Waste Recycling· Box. 351, Emmaus. PA 18049. U. S. A. 9. Compost, Land, Science Utilization: Journal of Wastey Recycling. Box 351, 18, South Seventh Street, Emmaus, PA 18049. U. S. A. 10. Conserver Society News, 512 Blvd. Wilfred Lavigne, Aylmer, Quebec J94 3W3. Canada. 11. Countryside, Highway 19 East, Waterloo, WI 53594. U. S. A. 12. Doing It: Practical Alternatives for Humanizing City Life. P. O. Box. 303, Worthington, Chio 43085. U S. A. 13. The Elements, 1901 Que Street, Washington, DC 20009. U. S. A· 14. U. S. Department of Energy· DOE Office of Public Affairs, Room 7203, Washington, DC 20545. U. S. A. 15. Environment, 560 Trinity Avenue, St. Louis Missouri 63130. U. S· A. 16. Food Monitor, P. O. Box. 1975, Garden City. N. Y. 11530 U. S. A. 17. The Futurist, A Journal of Forecasts, P. O. Box 19185, Twentieth Street Station, Washington, DC 20036. U. S. A. 18. Garbage Guide. Environmental Action Foundation, The Dupont Circle Building, Suite 724, Washington, DC 20036. U. S· A. 19. Growth Alternatives. 1785 Massachusetts Ave. NW, Washington, DC 20036. 20. Humanizing City Life. Ruth Kaswan, Editor, Urban Alternative Group, P. O. Box. 303, Worthington, CH 43085 U. S. A. 21. Intercharge: The Learning Exchage, P. O. Box. 920, Evanston, IL 60204. U· S. A. 22. A Magazine of Alternatives, P. O. Box 2300 Hendersonville, N. C. 28739. U. S. A. 23. Medical Self-care: Access to Medical Tools, Tom Ferguson Editor, P. O. Box. 718. Inverness, CA, 94937. U. S. A. 24. Mother Earth News, P. O. Box 70, Hendersonville, NC 28739 U. S. A. 25. CTT Association, 143, Maple Road, Surbiton, Surrey KT6 4BH. U. K. 26. Journal of the Post Industrial Age. The Ecologist, 73, Molesworth Street, Wadebridge, Cornwall, PL27, 705. U. K. 27. New Roots. Bimonthly with Supplements, Energy Office, University of Massachusetts, Amherst, MA 01003. U. S. A. 28. Not Man Apart, Friends of the Earth, 529 Commercial Street, San, Francisco, CA 94111. U. S. A. 29. Organic Gardening and Farming, Rodale press, 33 East Minor street, Emmaus, Penna. 18049. U. S. A. 30. Peace News, 8 Elm Street, Nottingham. U. K. 31. People and Energy, Centre for Science in the Public Interest 1757 'S' Street, N. W. Washington. DC. 20009 U. S. A. 32. Practical Self-Sufficiency. Broad, Ley Publishing Co·, Widdington, Saffron Walden, Essex CB11 3SP, U. K. 33. Radical Ecologist, P. O. Box. 87, Carlton South, Victoria 3053. Australia. 34. Radical Software. Ira Schneider and Beryl Korot Eds, Raindance Corp, 51 Fifth Ave. New York, N. Y. 10003 U. S. A. 35. Rural Development Network Bulletin, Everseas Liaison Committee. American Council on Education, 11 Dupont Circle, Washington D. C. 20036 U. S. A. 36. Science for the people, 9 Walden Street, Jamaica Plain. MA 02130. U. S. A. 37. Second Thoughts, Basic Choices Inc, 1121 University Avenue, Madison, WI 53715. U. S. A. 38. Self-help, Reporter, National Self-help Clearing House. Graduate School and University Center / CUNY, 33 West 42nd Street, Room 1227, New York, NY 10036. 39. Self-Help Spotlight, Editor Yvonne Robinson. Self-Help Clearing House, 170 Kingston Road, London SW19 3NX 40. Seminar, Romesh Thapar, Editor, Past Box 338, New Delhi-1, 'India. 41. Simple Living. American Frinds Service Committee, 514 Bryant Street, Palo Alto, CA 94302. 42. Solar Energy Digest. Editor William B. Edmondson, S. C. D, P. O. Box. 47776, San Diego, CA 92117. 43. Solar News and Views, ISES, quarterly. Solar Energy Journal. ISES, American Section, 300 State Road, 401, Cape Canaveral. FL 32920 U. S. A. 44. Spark, CSRE, 475 Riverside, Drive, New York, NY 10027. U. S. A. 45. Street, Magazine of the Environment, 240 Hall Street, Brooklyn, NY 11205 U. S. A.

BOOK WATCHING

Food and Health: (By Ramdas Murthy and others, published by National Institute of Nutrition, ICMR, Hyderabad, 1979, pp. 152) : This isn't just one of the numerous books on nutrition. It is specially prepared for acquainting the general public with the facts on nutrition related to their every day life. First released in form of radio broadcasts in Telugu and then as their compilation in a book form, the revised edition of this book makes very interesting reading. It contains information which would be of help to village level workers, health and social workers, training personnel of various levels as well as to the general public. The topics covered include balanced diet, nutrition for children and women, common foodgrains, nutrition programmes and the diseases associated with the diet. Topics of special significance like effect of social and cultural beliefs on nutritional status, adulteration, and nutrition and family planning are also covered. The charts on nutritive values of common foodstuffs, balanced diet and home measures are informative.

Development and Transfer of Technology: for rainfed Agriculture and the SAT farmer (Proceeding of the Inaugural Symposium at ICRISAT, Edited by Vrinda Kumble, published by ICRISAT, Patancheru P O., A. P. 502324, p.p. 324.): An international seminar on Development and Transfer of Technology for Rainfed Agriculture and the SAT Farmer was held at ICRISAT Centre, Patancheru from 28th August to 1st September, 1979. Scientists and development workers from 28 countries and representatives from four international agencies participated in the seminar to review the work of ICRISAT, discuss the philosophy, concept and practice of technology transfer and the problems and potentialities of the work. The final session was held on the establishment of linkages for transfer of technology–the problems and prospects. The tremendous work involved in editing of all these papers in form of this book would be really meaningful–in the words of ICRISAT'S Director General–'when the results can be effectively conveyed to their ultimate user–the farmer'.

Development: Seeds of change–village through global order : (Journal of the SID–Society for International Development, Palazzo Civiltadel Lavoro, 11 144, Rome, Italy.) : The first issue of 1981 is specially devoted to the participation of the rural poor in development. The material is divided into four sub-heads viz. pre-thinking (concept), case studies, knitting together and action research. The case studies deal with the various experiments carried out by activists in India, Pakistan, Peru, Chile, Ethiopia and Nepal. Other articles discuss the roles of activists, science, collective economic manangement and law in the alternative development strategies.

SCIENCE SHOULD BE UTILISED FOR PRODUCING INSTRUMENTS THAT WOULD SERVE MAN AND NOT ARMAMENTS THAT WOULD KILL

– VINOBA BHAVE

*

ECOLOGY : NO BLIND FOLLOWINE PLEASE !

• SURINDER SURI, Head, Deptt. of Political Science, Punjab Univ, Patiala.

Environmental movements have become modish in the last decade and world-wide fashions have their inevitable impact on India. Environmental and ecological groups have now sprung up here, and the government, equally sensitive to changing fads, has followed suit. But there is as yet no recognition that only the distinctive ecological ideas are appropriate to India.

Our environmental conditions are vastly different from those of the Western countries. Not only must our approach be different, but, from our history and social experience, we can make many original contributions to the global discussions on ecology. As a semi-tropical land in most of its territory, the relationship between man and environment here is vastly different from that of the northern countries. In the northern zones, man could survive only in an adversary relationship with nature. He had to continuously protect himself against natural forces, and indeed wrest nutrition and survival from them. Survival and well-being could not be taken for granted but had to be planned and carried out like a military operation. With the growth of technology and experimental science in the past several centuries, man has now become the master of natural forces However, as in any long-drawn-out warfare, the victor is fearful that the opponent may yet spring a surprise on him. Hence, the attempt to be generous to the ancient foe, to win it over with offers of protection and freindliness.

In India, man's relationship with and attitude to nature (plants, animals and natural forces) have always been friendly, often worshipful. Indian myths and legends treat man and the nature (who has been generous to man) as part of one vast family. Here a man could survive without clothes, houses, or elaborate arrangements for self-defence against the environment. It had the negative consequence that people did not develop the critical, analytical and manipulative attitude towards natural forces. Hence, we lagged in the development of technology and experimental science. Because of the generous and congenial environmental conditions, Indian culture and civilisation advanced rapidly in the beginning, but then stagnated. The backward people of the northern zones learnt to make use of any skills to advance themselves, eventually overtaking the eastern people.

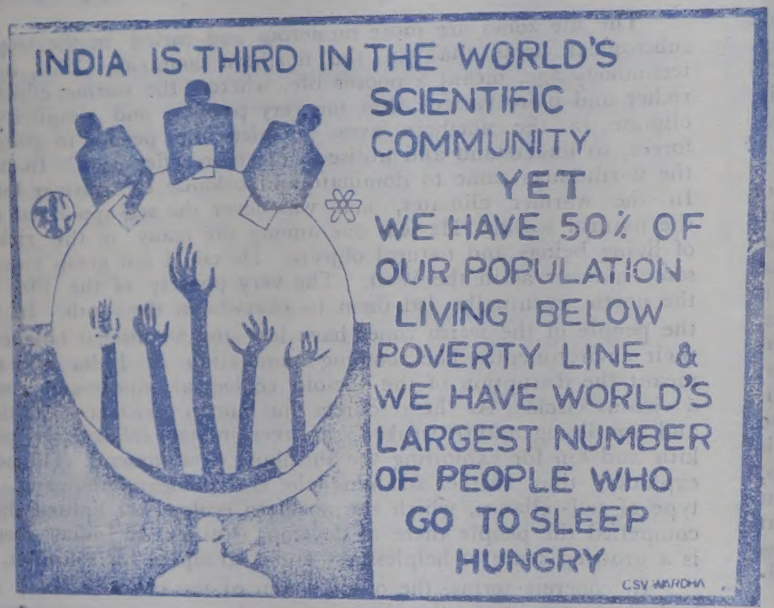
Basically, the ecological and environmental movements in the West attempt to move society towards a mutually supportive relationship between man and nature, such as has been the tradition in India. However, the Indian ecological attitudes and practices being pre-scientific, India too needs Western technology and science. But the synthesis that is called for cannot be affected in a constructive manner until Indians become critically aware of their own traditions. Rather, there must be a successful grafting of Western sciences on the roots of Indian culture and social institutions and vice-versa in the West.

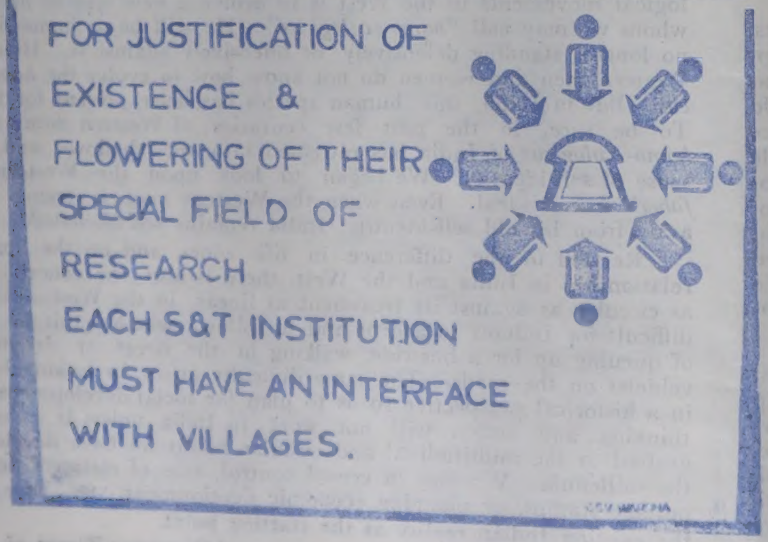
The life zones are more numerous and varied in the tropical and subtropical areas than in the northern countries. This, in the pre-technology age, meant a poorer life, whereas the warmer climates were richer and more varied. But the very poverty and simplicity of the climate in the northern areas enabled the people to grasp natural forces, to understand and utilise them more effectively. In due couse, the northerners came to dominate and colonise the warmer territorites. In the warmer climates, man was never the self-appointed master of the natural world. He was one among the many in the rich variety of living beings and natural objects. He could not grasp nature in the same manner as in the West. The very poverty of the life zones in the north eventually led them to overwhelm the south. In this way, the people of the warm zones have lost the traditional balance within their environment. The zooming population in India and elsewhere meant the disruption of the age-old ecological adjustments and created a vicious circle. As the resources for human existence in the living and non-living nature weaken, an ever-greater reliance is placed on kith and kin for exploiting the shrinking environment. The population explodes, thus further straining the environmental resources. But the type of self-reliance, which the northern ecology of limited life zones compelled the people there to develop, is absent in India. Hence there is a growing sense of helplessness and a grouping for solutions.

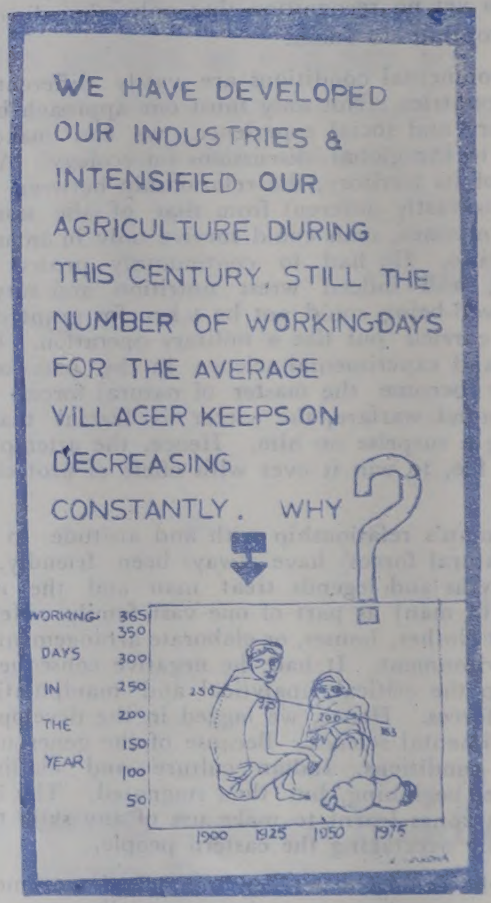
In concrete terms, the over-all aim of the environmental and ecological movements in the West is to evolve a new type of human being whom we may call "*homo-ecologicus*". He will be at home in nature, no longer standing defensively or offensively against it. However, the Western men and women do not know how to evolve the *homo-ecologicus*. But in India, this human species has been present for millennia. To be sure, in the past few centuries of Western domination, the *homo-ecologicus* of India has retreated into the shadows and lost his sense of self-identity. We began to look upon the Western "*homo-faber*" as our ideal. Even when the Western man is trying to move away from his old self-identity, India remains self-alienated.

Related to the difference in life zones and in the man-nature relationship in India and the West, there is also the concept of time as circular as against its treatment as linear in the West. Linearity is difficult for Indians to accept and to follow, whether this be in terms of queuing up for a bus-ride, walking in the street or driving motor vehicles on the roads. The same difficulty arises in looking backwards in a historical perspective so as to plan for social development. Linear thinking and action will not work in India unless it is successfully grafted to the multitudinal and circular habits we have developed over the millennia. Whether in crowd control, sale of railways tickets and postage stamps, or planning economic development, we have to take the existing Indian reality as the starting point.

[Courtesy : Times of India]


INDIA IS THIRD IN THE WORLD'S SCIENTIFIC COMMUNITY
YET
WE HAVE 50% OF OUR POPULATION LIVING BELOW POVERTY LINE &
WE HAVE WORLD'S LARGEST NUMBER OF PEOPLE WHO GO TO SLEEP HUNGRY


FOR JUSTIFICATION OF EXISTENCE &
FLOWERING OF THEIR SPECIAL FIELD OF RESEARCH
EACH S&T INSTITUTION MUST HAVE AN INTERFACE WITH VILLAGES.

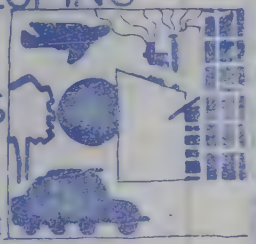

WE HAVE DEVELOPED OUR INDUSTRIES & INTENSIFIED OUR AGRICULTURE DURING THIS CENTURY, STILL THE NUMBER OF WORKINGDAYS FOR THE AVERAGE VILLAGER KEEPS ON DECREASING CONSTANTLY. WHY
WORKING DAYS IN THE YEAR
365
350
300
250
200
150
100
50
1900
1925
1950
1975

G.S.V. (WARDHA

S&T INPUTS ARE CREATING
DISPARITIES BETWEEN

AFFLUENT &
DEVELOPING

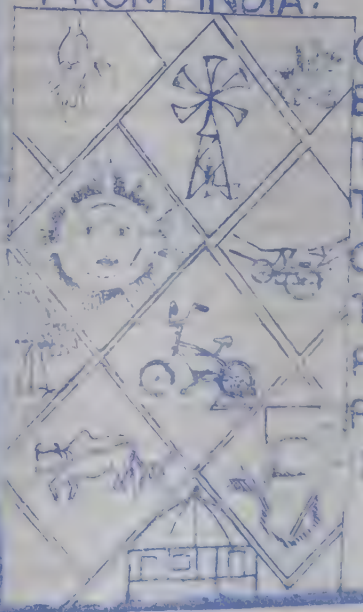
VILLAGES & CITIES



RICH &
POOR PEOPLE

TO REVERSE THE PROCESS
LOW CAPITAL, LOW ENERGY
DECENTRALIZED
LABOUR INTENSIVE
MODES BE EVOLVED

AT LEAST A THOUSAND
TECHNIQUES ARE NEEDED TO
PROVIDE NON-TRADITIONAL,
NON-FARM OCCUPATIONS
TO REMOVE POVERTY
FROM INDIA.



OUR LABS SHOULD
EVOLVE NEW
TECHNOLOGY
THAT CAN BE
CONVERTED INTO
TRADE AND
PROFESSION
FOR THE
IDLE HANDS.

WINDOW TO THE WORLD

MULTI-PURPOSE POWER UNIT FOR RURAL APPLICATION : Mr. Akkal Man Nakarmi of Kathmandu Metal Industry, Kathmandu, Nepal, has developed a 'multi-purpose power unit' (MPPU) for rural applications. The unit can be driven by water power, biogas, wind energy, draught animal power or any other conventional power source. It provides enough power to grind flour, to light an electric bulb, to run a rice huller, an oil expeller and other machines. It requires a total investment of 1675 U. S. dollars and daily operational cost comes to 32 U. S. dollars. The hourly revenues are estimated as 1. 12 U. S. dollars. The first test of unit was carried out at Godavri, Kathmandu valley in September, 1980. Work on further improvement of the unit is in progrees.

CONSTRUCTION : The unit is made of three detachable parts. The top section houses a grindstone and a hopper for grinding maize, wheat or other grain. The middle section houses the power transfer unit and is the heart of the system. It contains two shafts, one vertical and the other horizontal. One of the shafts runs a 12V DC dynamo for charging batteries which can supply enough power to light several flourescent tubes, run a radio, a small refrigerator (08m³), a water pump, or any of the several other devices. The bottom section holds a water wheel providing upto 24 H. P. It can be replaced by an electric motor, directly coupled, or by a pulley deriving power from any other external source, such as a biogas engine.

APPLICATIONS : The MPPU has applications in several fields such as : *Food processing* : Especially flour milling, rice milling, oil expeller, winnower, paddy and wheat thresher, mortar and pestle, grinding, hydraulic press, hot air blower for drying farm produce, small-scale irrigation etc. *Cottage industry* : Especially, wood working machines, planer bench saw, circular saw, lathe looms for silk or cotton, bellows for blacksmithy, trip hammer, stone crusher etc. *Domestic applications* : Especially small-scale electricity generation. The unit can run a 2-3 KW generator for lighting and power.

SOLAR ENERGY IN CHINA : China has made unprecedented progress in developing solar energy in the past five years. While scientists explore basic theories, research institutes and industries have developed new high quality materials for tapping solar rays and are engaged in the manufacture and popularisation of high-efficiency, low cost

(See Page 10)

WHY BILOFERTILIZERS ?

T. V. Subbiah, General Secretary, Asso. of Microbiologist of India.

Plants, like all other living beings, require nutritious food materials for their survival and healthy growth. Tney derive their food requirements from the soil through the roots. Nitrogen is one of the major elements required by plants in large quantities. Soil is an inert mineral substrate and does not contain any nitrogen in its native form. Dead remains of plants and animals release nitrogenous compounds into soil after decomposition. Repeated cultivation of crops, leaching by water and microbial denitrification deplete the nitrogen reserves of soil. It is, therefore, very necessary to replenish soil nitrogen by suitable means of soil management.

BIOLOGICAL NITROGEN FIXATION : Nature has ingenious contrivances for the orderly development and maintenance of life. The Earth's atmosphere contains abundant supply of elemental nitrogen in gaseous form. But plants are incapable of directly absorbing and utilising gaseous nitrogen. All the same, there are tiny, invisible microscopic germs in soil which are endowed with a miraculous power to absorb gaseous nitrogen directly from the air, convert it into stable nitrogenous compounds and supply the same to plants in easily available form. There are other bacteria in soil that enter the roots of certain plants and establish in colonies of large population inside enlarged out-growths on roots, called *rod nodule*, imbibe atmospheric nitrogen, convert it into stable nitrogen compounds and directly supply them to the plants. The plant, in turn, comfortably houses these bacteria and provides them with all their food requirements.

BIO-FERTILIZERS : Scientists have developed methods of isolation and large scale multiplication of nitrogen fixing bacteria in pure cultures in the laboratory. Biofertilizers are culture preparations of living nitrogen fixing bacteria. High Nitrogen Fixing strains are carefully chosen by natural selection. These bacteria are grown in large numbers and are suitably stabilised for maximum viability, as only living bacteria can multiply in the soil and fix nitrogen. Biofertilizers, in the form they are supplied to farmers, contain around 100 million nitrogen fixing bacteria per gram. Immediately after their application in the soil, these bacteria multiply in enormous numbers inside or around the roots Zone. The quantity of nitrogen eventually fixed and supplied to crop plants is estimated to be around 50–150 kgs per hectare.

NITROGEN FIXING BACTERIA : 'Rhizobium' bacteria is a root nodule forming organism and is specially suited for legume or pulse crops. There is a special Rhizobium culture suitable for each variety of crop. It is, therefore, very important to use the specified culture for the specified crop only. These Rhizobium cultures are also known as '*Symbiotic nitrogen fixers*' as they establish direct union with plants by root nodule formation. 'Azotobacter' is a non-symbiotic nitrogen fixing bacterium suitable for soil nitrogen fixation and may be applied to all crop plants as there is no specificity.

PHOSPHATE SOLUBILIZING BACTERIA : There are some soil bacteria which release phosphate from their normal state and make them available to plants. Several soils are rich in total phosphate but not in plant available phosphate. Under these conditions addition of phosphate solubilizing bacteria will be beneficial to crop growth. When the soil is poor in natural phosphate, then phosphate has to be applied. It is the usual practice to apply superphosphate which is the soluble form of phosphate. This is very costly. Instead, the much cheaper rock phosphate, along with phosphate solubilizing organisms can be applied. This is equivalent in effect, if not more.

WHY APPLY BIO-FERTILIZERS : It is true that Rhizobium and Azotobacter are natural inhabitants of soil. But their nitrogen fixing ability in their native form is very poor as compared with most commercial preparations. Exposure to heat during the fallow periods, soil fumigation and application of pesticides reduce their number in soil quite considerably. It is, therefore, very essential to replenish the population in large numbers, year after year, with high nitrogen yielding biofertilizers. Agronomists, all over the world, have confirmed the beneficial effects of application of biofertilizers. Increase in crop yields vary from 20 to 200 percent depending upon the crop and other factors.

ADVANTAGES OF BIO-FERTILIZERS : Better percentage of germination due to stimulation, faster rate of growth on account of growth factors, healthier crop, on account of increased disease resistance, more proteins in crops due to sustained release of nitrogen, better yields on account of combination of all desirable factors. Bio-fertilizers, above all, have manifest effect on soil pathogen on account of their fungicidal and bactericidal properties due to production of antibiotics. The result is a healthy crop.

[Adapted from the publication of TECHNOTRAN, 110, West Sandaipettai street, Madurai - 625001, the manufacturers of biofertilizers]

WINDOW TO THE WORLD

(Contd. From Page No. 8)

devices for home heating, air-conditioning, solar distillation and evaporation. Solar heaters with a total area of 70,000 square meters are now in use in China, saving more than 20,080 tonnes of coal a year. Solar cells are being tried out in space flight, navigation and railway transport. Navigation buoy lamps powered by silicon cells are in use in waterways. Hall of the municipalities, provinces and autonomous regions in China are engaged in experiments for drying agricultural and sideline products. Latest statistics show that 2,100 solar stoves are in daily use in China. Solar water heaters have also been installed in schools, bath houses, offices, hospitals and other facilities in some cities.

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THE TREASURE

[We are herewith publishing a part of the list of periodicals received regularly by C. S. V. These publications brought out by groups, large or small, scattered throughout the world give an account of new ideas and efforts in various fields, directed towards evolving a new world order based on peace and non-violence. We hope it would be of immense help to our readers.]

1. The Adobe News, P. O. Box 702, Los Lunas, NM 87031, U. S. A. 2. Alternative Sources of Energy, Rt. 2 Box 90A, Milaca, MN 56353, U. S. A. 3. Alternative Perspectives on Society aud Environment, Irail College, Trent University, Peterborough, Ontario K9J 7B8. Canada. 4. Applied Ecology : Abstract. 1 Talconberg Court, London, W1V 5FG. England. 5. Architectural Design, 26, Bloomsbury Way, London WCl. England. 6. Canadian Information Sharing Service, CISS. 121, Avenue Road, Toronto M5R 2G3, Ontario, Canada. 7. Coevolution Quarterly, Stewart Brand Editor, P. O. Box. 428, Sausalito, CA 94965. U. S. A. 8. Compost Science: Journal of Waste Recycling· Box. 351, Emmaus. PA 18049. U. S. A. 9. Compost, Land, Science Utilization: Journal of Wastey Recycling. Box 351, 18, South Seventh Street, Emmaus, PA 18049. U. S. A. 10. Conserver Society News, 512 Blvd. Wilfred Lavigne, Aylmer, Quebec J94 3W3. Canada. 11. Countryside, Highway 19 East, Waterloo, WI 53594. U. S. A. 12. Doing It: Practical Alternatives for Humanizing City Life. P. O. Box. 303, Worthington, Chio 43085. U S. A. 13. The Elements, 1901 Que Street, Washington, DC 20009. U. S. A· 14. U. S. Department of Energy· DOE Office of Public Affairs, Room 7203, Washington, DC 20545. U. S. A. 15. Environment, 560 Trinity Avenue, St. Louis Missouri 63130. U. S· A. 16. Food Monitor, P. O. Box. 1975, Garden City. N. Y. 11530 U. S. A. 17. The Futurist, A Journal of Forecasts, P. O. Box 19185, Twentieth Street Station, Washington, DC 20036. U. S. A. 18. Garbage Guide. Environmental Action Foundation, The Dupont Circle Building, Suite 724, Washington, DC 20036. U. S· A. 19. Growth Alternatives. 1785 Massachusetts Ave. NW, Washington, DC 20036. 20. Humanizing City Life. Ruth Kaswan, Editor, Urban Alternative Group, P. O. Box. 303, Worthington, CH 43085 U. S. A. 21. Intercharge: The Learning Exchage, P. O. Box. 920, Evanston, IL 60204. U· S. A. 22. A Magazine of Alternatives, P. O. Box 2300 Hendersonville, N. C. 28739. U. S. A. 23. Medical Self-care: Access to Medical Tools, Tom Ferguson Editor, P. O. Box. 718. Inverness, CA, 94937. U. S. A. 24. Mother Earth News, P. O. Box 70, Hendersonville, NC 28739 U. S. A. 25. CTT Association, 143, Maple Road, Surbiton, Surrey KT6 4BH. U. K. 26. Journal of the Post Industrial Age. The Ecologist, 73, Molesworth Street. Wadebridge, Cornwall, PL27, 705. U. K. 27. New Roots. Bimonthly with Supplements, Energy Office, University of Massachusetts, Amherst, MA 01003. U. S. A. 28. Not Man Apart, Friends of the Earth, 529 Commercial Street, San, Francisco, CA 94111. U. S. A. 29. Organic Gardening and Farming, Rodale press, 33 East Minor street, Emmaus, Penna. 18049. U. S. A. 30. Peace News, 8 Elm Street, Nottingham. U. K. 31. People and Energy, Centre for Science in the Public Interest 1757 'S' Street, N. W. Washington. DC. 20009 U. S. A. 32. Practical Self-Sufficiency. Broad, Ley Publishing Co·, Widdington, Saffron Walden, Essex CB11 3SP, U. K. 33. Radical Ecologist, P. O. Box. 87, Carlton South, Victoria 3053. Australia. 34. Radical Software. Ira Schneider and Beryl Korot Eds, Raindance Corp, 51 Fifth Ave. New York, N. Y. 10003 U. S. A. 35. Rural Development Network Bulletin, Everseas Liaison Committee. American Council on Education, 11 Dupont Circle, Washington D. C. 20036 U. S. A. 36. Science for the people, 9 Walden Street, Jamaica Plain. MA 02130. U. S. A. 37. Second Thoughts, Basic Choices Inc, 1121 University Avenue, Madison, WI 53715. U. S. A. 38. Self-help, Reporter, National Self-help Clearing House. Graduate School and University Center / CUNY, 33 West 42nd Street, Room 1227, New York, NY 10036. 39. Self-Help Spotlight, Editor Yvonne Robinson. Self-Help Clearing House, 170 Kingston Road, London SW19 3NX 40. Seminar, Romesh Thapar, Editor, Past Box 338, New Delhi-1, 'India. 41. Simple Living. American Frinds Service Committee, 514 Bryant Street, Palo Alto, CA 94302. 42. Solar Energy Digest. Editor William B. Edmondson, S. C. D, P. O. Box. 47776, San Diego, CA 92117. 43. Solar News and Views, ISES, quarterly. Solar Energy Journal. ISES, American Section, 300 State Road, 401, Cap. Canaveral. FL 32920 U. S. A. 44. Spark, CSRE, 475 Riverside, Drive, New York, NY 10027. U. S. A. 45. Street, Magazine of the Environment, 240 Hall Street, Brooklyn, NY 11205 U. S. A.

BOOK WATCHING

Food and Health: (By Ramdas Murthy and others, published by National Institute of Nutrition, ICMR, Hyderabad, 1979, pp. 152) : This isn't just one of the numerous books on nutrition. It is specially prepared for acquainting the general public with the facts on nutrition related to their every day life. First released in form of radio broadcasts in Telugu and then as their compilation in a book form, the revised edition of this book makes very interesting reading. It contains information which would be of help to village level workers, health and social workers, training personnel of various levels as well as to the general public. The topics covered include balanced diet, nutrition for children and women, common foodgrains, nutrition programmes and the diseases associated with the diet. Topics of special significance like effect of social and cultural beliefs on nutritional status, adulteration, and nutrition and family planning are also covered. The charts on nutritive values of common foodstuffs, balanced diet and home measures are informative.

Development and Transfer of Technology: for rainfed Agriculture and the SAT farmer (Proceeding of the Inaugural Symposium at ICRISAT, Edited by Vrinda Kumble, published by ICRISAT, Patancheru P O., A. P. 502324, p.p. 324.) : An international seminar on Development and Transfer of Technology for Rainfed Agriculture and the SAT Farmer was held at ICRISAT Centre, Patancheru from 28th August to 1st September, 1979. Scientists and development workers from 28 countries and representatives from four international agencies participated in the seminar to review the work of ICRISAT, discuss the philosophy, concept and practice of technology transfer and the problems and potentialities of the work. The final session was held on the establishment of linkages for transfer of technology–the problems and prospects. The tremendous work involved in editing of all these papers in form of this book would be really meaningful–in the words of ICRISAT'S Director General–'when the results can be effectively conveyed to their ultimate user-the farmer'.

Development: Seeds of change–village through global order: (Journal of the SID–Society for International Development, Palazzo Civiltadel Lavoro, 11 144, Rome, Italy.) : The first issue of 1981 is specially devoted to the participation of the rural poor in development. The material is divided into four sub-heads viz. pre-thinking (concept), case studies, knitting together and action research. The case studies deal with the various experiments carried out by activists in India, Pakistan, Peru, Chile, Ethiopia and Nepal. Other articles discuss the roles of activists, science, collective economic manangement and law in the alternative development strategies.

SCIENCE SHOULD BE UTILISED FOR PRODUCING INSTRUMENTS THAT WOULD SERVE MAN AND NOT ARMAMENTS THAT WOULD KILL

– VINOBA BHAVE

*

ECOLOGY : NO BLIND FOLLOWINE PLEASE !

• SURINDER SURI, Head, Deptt. of Political Science, Punjab Univ, Patiala.

Environmental movements have become modish in the last decade and world-wide fashions have their inevitable impact on India. Environmental and ecological groups have now sprung up here, and the government, equally sensitive to changing fads, has followed suit. But there is as yet no recognition that only the distinctive ecological ideas are appropriate to India.

Our environmental conditions are vastly different from those of the Western countries. Not only must our approach be different, but, from our history and social experience, we can make many original contributions to the global discussions on ecology. As a semi-tropical land in most of its territory, the relationship between man and environment here is vastly different from that of the northern countries. In the northern zones, man could survive only in an adversary relationship with nature. He had to continuously protect himself against natural forces, and indeed wrest nutrition and survival from them. Survival and well-being could not be taken for granted but had to be planned and carried out like a military operation. With the growth of technology and experimental science in the past several centuries, man has now become the master of natural forces However, as in any long-drawn-out warfare, the victor is fearful that the opponent may yet spring a surprise on him. Hence, the attempt to be generous to the ancient foe, to win it over with offers of protection and freindliness.

In India, man's relationship with and attitude to nature (plants, animals and natural forces) have always been friendly, often worshipful. Indian myths and legends treat man and the nature (who has been generous to man) as part of one vast family. Here a man could survive without clothes, houses, or elaborate arrangements for self-defence against the environment. It had the negative consequence that people did not develop the critical, analytical and manipulative attitude towards natural forces. Hence, we lagged in the development of technology and experimental science. Because of the generous and congenial environmental conditions, Indian culture and civilisation advanced rapidly in the beginning, but then stagnated. The backward people of the northern zones learnt to make use of any skills to advance themselves, eventually overtaking the eastern people.

Basically, the ecological and environmental movements in the West attempt to move society towards a mutually supportive relationship between man and nature, such as has been the tradition in India. However, the Indian ecological attitudes and practices being pre-scientific, India too needs Western technology and science. But the synthesis that is called for cannot be affected in a constructive manner until Indians become critically aware of their own traditions. Rather, there must be a successful grafting of Western sciences on the roots of Indian culture and social institutions and vice-versa in the West.

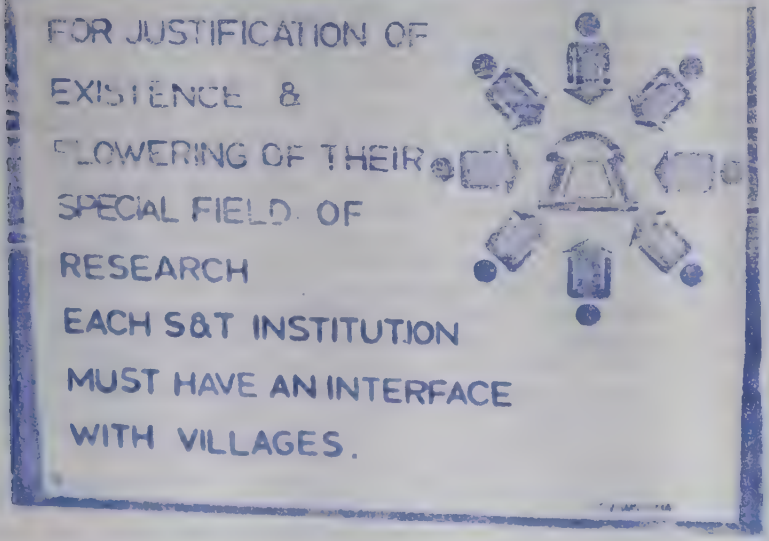
The life zones are more numerous and varied in the tropical and subtropical areas than in the northern countries. This, in the pre-technology age, meant a poorer life, whereas the warmer climates were richer and more varied. But the very poverty and simplicity of the climate in the northern areas enabled the people to grasp natural forces, to understand and utilise them more effectively. In due couse, the northerners came to dominate and colonise the warmer territorites. In the warmer climates, man was never the self-appointed master of the natural world. He was one among the many in the rich variety of living beings and natural objects. He could not grasp nature in the same manner as in the West. The very poverty of the life zones in the north eventually led them to overwhelm the south. In this way, the people of the warm zones have lost the traditional balance within their environment. The zooming population in India and elsewhere meant the disruption of the age-old ecological adjustments and created a vicious circle. As the resources for human existence in the living and non-living nature weaken, an ever-greater reliance is placed on kith and kin for exploiting the shrinking environment. The population explodes, thus further straining the environmental resources. But the type of self-reliance, which the northern ecology of limited life zones compelled the people there to develop, is absent in India. Hence there is a growing sense of helplessness and a grouping for solutions.

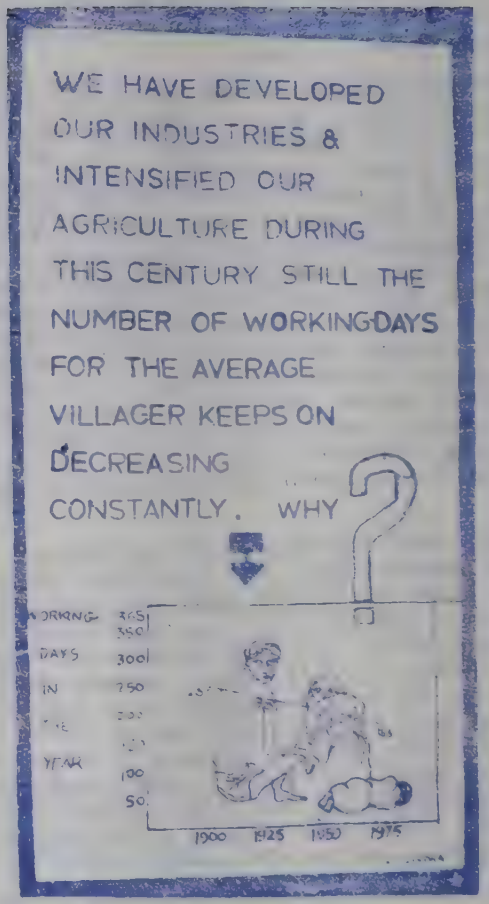
In concrete terms, the over-all aim of the environmental and ecological movements in the West is to evolve a new type of human being whom we may call "*homo-ecologicus*". He will be at home in nature, no longer standing defensively or offensively against it. However, the Western men and women do not know how to evolve the *homo-ecologicus*. But in India, this human species has been present for millennia. To be sure, in the past few centuries of Western domination, the *homo-ecologicus* of India has retreated into the shadows and lost his sense of self-identity. We began to look upon the Western "*homo-faber*" as our ideal. Even when the Western man is trying to move away from his old self-identity, India remains self-alienated.

Related to the difference in life zones and in the man-nature relationship in India and the West, there is also the concept of time as circular as against its treatment as linear in the West. Linearity is difficult for Indians to accept and to follow, whether this be in terms of queuing up for a bus-ride, walking in the street or driving motor vehicles on the roads. The same difficulty arises in looking backwards in a historical perspective so as to plan for social development. Linear thinking and action will not work in India unless it is successfully grafted to the multitudinal and circular habits we have developed over the millennia. Whether in crowd control, sale of railways tickets and postage stamps, or planning economic development, we have to take the existing Indian reality as the starting point.

[Courtesy : Times of India]


INDIA IS THIRD IN THE WORLD'S SCIENTIFIC COMMUNITY
YET
WE HAVE 50% OF OUR POPULATION LIVING BELOW POVERTY LINE &
WE HAVE WORLD'S LARGEST NUMBER OF PEOPLE WHO GO TO SLEEP HUNGRY


FOR JUSTIFICATION OF EXISTENCE &
FLOWERING OF THEIR SPECIAL FIELD OF RESEARCH
EACH S&T INSTITUTION MUST HAVE AN INTERFACE WITH VILLAGES.

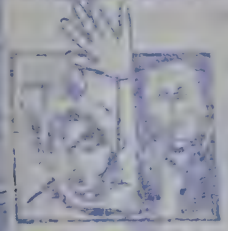

WE HAVE DEVELOPED OUR INDUSTRIES & INTENSIFIED OUR AGRICULTURE DURING THIS CENTURY STILL THE NUMBER OF WORKING DAYS FOR THE AVERAGE VILLAGER KEEPS ON DECREASING CONSTANTLY. WHY
WORKING DAYS IN THE YEAR
365
350
300
250
100
50
1900
1925
1950
1975

C.S.V. WARDHA

S&T INPUTS ARE CREATING DISPARITIES BETWEEN

AFFLUENT & DEVELOPING

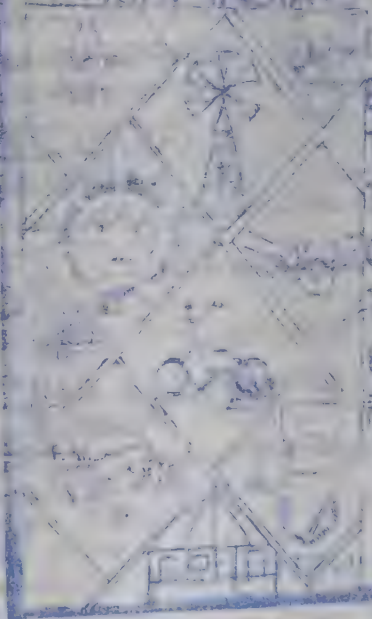
VILLAGES & CITIES



RICH & POOR PEOPLE

TO REVERSE THE PROCESS LOW CAPITAL, LOW ENERGY DECENTRALIZED LABOUR INTENSIVE MODES BE EVOLVED

AT LEAST A THOUSAND TECHNIQUES ARE NEEDED TO PROVIDE NON-TRADITIONAL, NON-FARM OCCUPATIONS TO REMOVE POVERTY FROM INDIA.



OUR LABS SHOULD EVOLVE NEW TECHNOLOGY THAT CAN BE CONVERTED INTO TRADE AND PROFESSION FOR THE DUE MASS.

WINDOW TO THE WORLD

MULTI-PURPOSE POWER UNIT FOR RURAL APPLICATION : Mr. Akkal Man Nakarmi of Kathmandu Metal Industry, Kathmandu, Nepal, has developed a 'multi-purpose power unit' (MPPU) for rural applications. The unit can be driven by water power, biogas, wind energy, draught animal power or any other conventional power source. It provides enough power to grind flour, to light an eletric bulb, to run a rice huller, an oil expeller and other machines. It requires a total investment of 1675 U. S. dollars and daily operational cost comes to 32 U. S. dollars. The hourly revenues are estimated as 1. 12 U. S. dollars. The first test of unit was carried out at Godavri, Kathmandu valley in September, 1980. Work on further improvement of the unit is in progrees.

CONSTRUCTION : The unit is made of three detachable parts. The top section houses a grindstone and a hopper for grinding maize, wheat or other grain. The middle section houses the power transfer unit and is the heart of the system. It contains two shafts, one vertical and the other horizontal. One of the shafts runs a 12V DC dynamo for charging batteries which can supply enough power to light several flourescent tubes, run a radio, a small refrigerator ($08m^3$), a water pump, or any of the several other devices. The bottom section holds a water wheel providing upto 24 H. P. It can be replaced by an electric motor, directly coupled, or by a pulley deriving power from any other external source, such as a biogas engine.

APPLICATIONS : The MPPU has applications in several fields such as : *Food processing* : Especially flour milling, rice milling, oil expeller, winnower, paddy and wheat thresher, mortar and pestle, grinding, hydraulic press, hot air blower for drying farm produce, small-scale irrigation etc. *Cottage industry* : Especially, wood working machines, planer, bench saw, circular saw, lathe looms for silk or cotton, bellows for blacksmithy, trip hammer, stone crusher etc. *Domestic applications* : Especially small-scale electricity generation. The unit can run a 2–3 KW generator for lighting and power.

SOLAR ENERGY IN CHINA : China has made unprecedented progress in developing solar energy in the past five years. While scientists explore basic theories, research institutes and industries have developed new high quality materials for tapping solar rays and are engaged in the manufacture and popularisation of high-efficiency, low cost

(See Page 10)

TO THE SCIENTISTS OF INDIA :

"Unless all the discoveries that you make have the welfare of the poor as the end in view, all yeur workshops will be really no better than satan's workshops"

- Gandhiji

WHY BILOFERTILIZERS ?

T. V. Subbiah, General Secretary, Asso. of Microbiologist of India.

Plants, like all other living beings, require nutritious food materials for their survival and healthy growth. They derive their food requirements from the soil through the roots. Nitrogen is one of the major elements required by plants in large quantities. Soil is an inert mineral substrate and does not contain any nitrogen in its native form. Dead remains of plants and animals release nitrogenous compounds into soil after decomposition. Repeated cultivation of crops, leaching by water and microbial denitrification deplete the nitrogen reserves of soil. It is, therefore, very necessary to replenish soil nitrogen by suitable means of soil management.

BIOLOGICAL NITROGEN FIXATION : Nature has ingenious contrivances for the orderly development and maintenance of life. The Earth's atmosphere contains abundant supply of elemental nitrogen in gaseous form. But plants are incapable of directly absorbing and utilising gaseous nitrogen. All the same, there are tiny, invisible microscopic germs in soil which are endowed with a miraculous power to absorb gaseous nitrogen directly from the air, convert it into stable nitrogenous compounds and supply the same to plants in easily available form. There are other bacteria in soil that enter the roots of certain plants and establish in colonies of large population inside enlarged out-growths on roots, called *rod nodule*, imbibe atmospheric nitrogen, convert it into stable nitrogen compounds and directly supply them to the plants. The plant, in turn, comfortably houses these bacteria and provides them with all their food requirements.

BIO-FERTILIZERS : Scientists have developed methods of isolation and large scale multiplication of nitrogen fixing bacteria in pure cultures in the laboratory. Biofertilizers are culture preparations of living nitrogen fixing bacteria. High Nitrogen Fixing strains are carefully chosen by natural selection. These bacteria are grown in large numbers and are suitably stabilised for maximum viability, as only living bacteria can multiply in the soil and fix nitrogen. Biofertilizers, in the form they are supplied to farmers, contain around 100 million nitrogen fixing bacteria per gram. Immediately after their application in the soil, these bacteria multiply in enormous numbers inside or around the roots Zone. The quantity of nitrogen eventually fixed and supplied to crop plants is estimated to be around 50-150 kgs per hectare.

NITROGEN FIXING BACTERIA : 'Rhizobium' bacteria is a root nodule forming organism and is specially suited for legume or pulse crops. There is a special Rhizobium culture suitable for each variety of crop. It is, therefore, very important to use the specified culture for the specified crop only. These Rhizobium cultures are also known as '*Symbiotic nitrogen fixers*' as they establish direct union with plants by root nodule formation. 'Azotobacter' is a non-symbiotic nitrogen fixing bacterium suitable for soil nitrogen fixation and may be applied to all crop plants as there is no specificity.

PHOSPHATE SOLUBILIZING BACTERIA : There are some soil bacteria which release phosphate from their normal state and make them available to plants. Several soils are rich in total phosphate but not in plant available phosphate. Under these conditions addition of,phosphate solubilizing bacteria will be beneficial to crop growth. When the soil is poor in natural phosphate, then phosphate has to be applied. It is the usual practice to apply superphosphate which is the soluble form of phosphate. This is very costly. Instead, the much cheaper rock phosphate, along with phosphate solubilizing organisms can be applied. This is equivalent in effect, if not more.

WHY APPLY BIO-FERTILIZERS : It is true that Rhizobium and Azotobacter are natural inhabitants of soil. But their nitrogen fixing ability in their native form is very poor as compared with most commercial preparations. Exposure to heat during the fallow periods, soil fumigation and application of pesticides reduce their number in soil quite considerably. It is, therefore, very essential to replenish the population in large numbers, year after year, with high nitrogen yielding biofertilizers. Agronomists, all over the world, have confirmed the beneficial effects of application of biofertilizers. Increase in crop yields vary from 20 to 200 percent depending upon the crop and other factors.

ADVANTAGES OF BIO-FERTILIZERS : Better percentage of germination due to stimulation, faster rate of growth on account of growth factors, healthier crop, on account of increased disease resistance, more proteins in crops due to sustained release of nitrogen, better yields on account of combination of all desirable factors. Bio-fertilizers, above all, have manifest effect on soil pathogen on account of their fungicidal and bactericidal properties due to production of antibiotics. The result is a healthy crop.

[Adapted from the publication of TECHNOTRAN,110, West Sandaipettai street, Madurai - 625001, the manufacturers of biofertilizers]

WINDOW TO THE WORLD

(Contd. From Page No. 8)

devices for home heating, air-conditioning, solar distillation and evaporation. Solar heaters with a total area of 70,000 square meters are now in use in China, saving more than 20,080 tonnes of coal a year. Solar cells are being tried out in space flight, navigation and railway transport. Navigation buoy lamps powered by silicon cells are in use in waterways. Hall of the municipalities, provinces and autonomous regions in China are engaged in experiments for drying agricultural and sideline products. Latest statistics show that 2,100 solar stoves are in daily use in China. Solar water heaters have also been installed in schools, bath houses, offices, hospitals and other facilities in some cities.

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NEWS & VIEWS

Living Fungicides: Biological control can work against many devastating plant diseases like rusts, powdery and downy mildews. It is likely to be inexpensive as compared with the production and application of chemicals which act as crop protectants and therapeutic agents. It consists of the use of the hyperparasites, which are "living fungicides", which are able to adapt themselves to changes in their host fungus (pathogens of crop plants). The evolving of "living fungicides" will, therefore, enable prevent pollution of the environment which is endangered through higher pesticide use on different crop plants and fruit trees. Hyperparasitism (mycoparasitism), occurs with soil as well as with air-borne fungi. Biological control of root pathogens consists basically of encouraging the growth and activity of Trichoderma, some Actinomycetes, and other soil microorganisms which are antagonistic to the pathogen, generally by virtue of the antibiotics which they produce. Other possible associations which may, in time, become useful in plant disease and pest control include viruses versus fungi, bacteria, insects and possibly nematodes; bacteria versus insects and fungi versus fungi insects and nematodes. The potentialities of using antagonists to control plant diseases merit exploration. There is much to be learnt from studies of the production of toxins and enzymes by these parasities and the mode of host destruction.

-Dr. J. S. Chohan, Joint Director, Plant Disease Clinic, Punjab Agriculture University, Ludhiana.

Does Small-Scale Technology Help Small Farmers ?: Indian bamboo tubewells, often praised as an appropriate small-scale technology, may be benefiting wealthy Indian Landowners more than the peasant farmer. India's push to large-scale agricultural production in the "green revolution" years of the 1969s and 1970s brought with it steel tubewell irrigation programmes in the north-eastern state of Bihar. The wells were too expensive for small farmers, which prompted experiments with other materials locally available. It was eventually found that the steel pipe could be replaced by bamboo. Although the cost of bamboo tubewells is well within the reach of small farmers, researchers have found that large landholders get more benefit from them than do small farmers, because their larger plots often contain fields at many different elevations which require many wells to irrigate them. Inexpensive bamboo tubewells allow them to get water to all their land. A recent report on the use of bamboo tubewells in India says that of the first 1500 bamboo wells and the development of a large pump market eventually enabled more small farmers to sink tubewells. But even today, small farmers must often hire the pumps while wealthier farmers own their own equipment. This means many small farmers must buy water from the big landowners, who are using the appropriate technology supposed to bring benefits to the poor. -(Farming for Development, International Federation of Agricultural Producers, No. 2, 1980).

60 m Tonnes of Fertile Soil Lost Every Year: India is losing 60 million tonnes of fertile soil every year due to soil erosion. The market value of minerals contained in this washed away soil alone is estimated to the level of Rs. 700 crores. According to the Director, since 1952, over 4,200,000 hectares of forest land had been appropriated by industries and agriculture. This had resulted in enhanced flood damage which crossed over Rs. 1,000 crores every year.

-Director, National Park, Dudhwa.

Develop Rivers for Energy: Developing countries now import about 6 million barrels of oil a day. Their energy demands are expected to rise to 10 million barrels a day of oil equivalent over the next 10 years or 120,000 million U. S. dollars at current prices. Development of only half the water resources in the Third World would provide the same amount of energy now produced by the Organization of Petroleum Exporting Countries (about 20 million barrels of oil a day). If just a few of these international rivers like Ganges were developed, they would provide more than 4 million barrels a day of oil equivalent and a savings of 400,000 million U. S. dollars a year.

-Mabum Al Haq, Director of Policy, Planning and Programme Review for the World Bank.

Organic Farming: The National Science Foundation has conducted five-year study of 51 farms in the midwest corn belt found that farmers who used organic procedures consumed only about 40 percent of the energy required on conventional farms using chemical fertilizers and pesticides. The energy savings on organic farms mainly come from the fertilizers they no longer employ nitrogen in particular. The manure from three cows can adequately provide 125 kg. nitrogen, 35 kg. phosphorous, and 67 kg. potassium per year enough to fertilize one hectare of corn. Ploughing under legumes, such as sweet clover, will add about 150 pounds of nitrogen/hectafes the bacteria fix nitrogen from the atmosphere into the usable form of nitrate. A cannery's crab trash is used for nitrogen. The dust of basalt rock from road stone manufacturing is used for potassium and phosphorous.

-Report from the department of Agriculture, USDA, Washington DC.

ABOUT US

Project on S & T For Women :- The draft of the sixth five year plan places a special emphasis on the application of Sciece and Technology for Women, with the aim of reducing drudgery, increasing productivity and general standard of life and creating employment potentialities for them. As a first step towards materialising this objective, a task force has been created by 'Committee on Science and Technology for Women' formed by the D.S.T. The task force has entrusted C.S.V. with the responssibility of preparing a status report of S & T for women. A small multi-disciplinary team has already started working on this few month project commenced in September, 81. At the completion of phase one of this project, a status report based on the material collected by the documentation section of the C.S.V., giving an account of the work done by various CSIR and other laboratories which might be helpful to women, has been completed. The main areas covered in this report include drudgery, health and employment. Further work based on visits to the laboratories, workshops of eminent workers in this field and replies to questionaires etc. is in progress.

Gandhiji Remembered : Magan Sangrahalaya orgnised a colourful programme of varied activities to celebrate Gandhiji's birthday on Oct. 2. With a view to 'taking Gandhiji to schools', a painting contest for school children (Std. II to Std. X, in three categories) was held on Oct. 1. Eightyfive students painted, with deep understanding and imagination, pictures depicting Gandhiji's philosophy of *'Shramdan'*, *'Nashabandi'* *'Nature Cure'* and *'Adult Education'*. On 2nd Oct., Dr. M. S. Swaminathan, Secretary, Planning Commission, visited Magan Sangrahalaya and Takniki-pura campus and addressed a meeting of citizens and constructive workers at Magan Sangrahalaya. In his speech, he expressed his firm faith in Gandhiji's concept of 'planning with the last man as its nucleus' and elaborated at length, his views on rural technology. [Text of his speech is given on p. 4 of this issue.] A day-long 'Sutra Yadnya' was also conducted. The evening of Oct. 3 was again a children's special. Students from various schools of Wardha presented a rich variety of programmes including group songs, group dances and skits. Special mention should be made of the enthusiastic and lively participation of the students of the local school for the physically handicapped. Bhaskar, a Xth class student and the youngest worker of C.S.V., who was in chair, gave away the prizes to the winners of the painting contest and teams presenting the cultural programme.

Screen Printing At C.S.V. :- The cover page of this issue of S.F.V. bulletin has been ably printed by a simple screen printing technique at C.S.V. Two of our workers, Shri Sudhir Pargaonkar and Shri Kishor Pradhan have achieved good results with almost no training in this technique and using no artificial light. The cover page of the C.S.V. report of activities entitled "C.S.V. work at work 79-81' has also been printed by the same technique. C.S.V. is now working on developing screen printing as a low-capital, de-centralised service industry.

Poster Cards On Science :- C.S.V. had displayed a few posters on 'Whither Science ?' at the Indian Science Congress convention held at Banaras in Jan., 81, and later in many other exhibitions and finally in Magan Sangrahalaya. The posters, appreciated by many, raised sharp questions on the orientation and utility of present S & T and strongly advocated the need for evolving a *'technology with a human face.'* Some of these posters are printed in this issue (pages 6 and 7). They are also available in form of seperate poster cards. Orders for the same may be placed at C.S.V.

HOW YOU CAN HELP US

* Send for publication your experiments and experiences or information in rural technology you come across.
* Enroll subscribers (annual subscription for individuals Rs. 15/- and Institutions Rs. 25/- in India and for abroad, US Dollars 10 and 15 respectively) by sending addresses whom a free sample copy will be sent.
* Solicit appropriate advertisements to help financing this publication (Rs. 1000 for full page, Rs. 500 for half and Rs. 250 for quartar page per insertion).

Please write to : The Editor, Science for Villages, Magan Sangrahalaya, Wardha- 442001, (M.S.), INDIA.

Cover pages printed on Hand Made Paper made from Banana Fibres at C. S. V., Wardha : Printed and Pubished by Ajay Kumar on behalf of Science for Villages, Wardha. Chief Editor : Devendra Kumar, Editorial Office : Centre of Science for Villages, Magan Sangrahalaya, Wardha., Printed by Rashtrabhasha Press, Wardha.

Regd. No. WDA-119

VOL. V, No. 3

Dec. 1981

SCIENCE FOR PEACE

Science for Villages translated in practice means Science for Peace. It is the competitive aspect in the economies of the world, buttressed and fuelled by technological development, that leads to the conflicting interests between nations becoming more and more pronounced. In times when man had simpler tools of production as well as of destruction—the injury he could inflict, on one another and the nature around, was limited. With the sophistication of technology, this danger has reached catastrophic dimensions. The need is of reducing the competetive and conflict potential in the production systems and replace them by one which is cooperative in nature. To this problem, the movements for socially satisfying and ecologically balanced technologies can provide the answer. The hurdles in this direction, however, seem unsurmountable as the megalomania in which the world is caught up, makes even the suggestion of working for 'Small' a suspect in the eyes of those who want to bring the country at par with the more affluent and powerful of the world. How this is leading towards sure destruction of man and his planet must be evident to everyone who observes the arms and armaments race we are all become a partner of.

Brandt Commission report laments that 'the most dynamic and rapid transfer of highly sophisticated equipment and technology from rich to poor countries has been, in the machinery of death.' It says, "Industrialized countries too need more appropriate technologies which conserve energy and exhaustible resources, which avoid rapid job displacement and which do not damage the ecology... It is a question of enabling the inventiveness and enterprise of scientists and engineers everywhere to give the fullest possible benefit to mankind."

Mrs. Inga Thorson, Chairman of the Group of Government Experts on the Relationship Between Disarmament and Development says in her recent report (20th Oct. 81) that the study has strengthened the economic and social case for the disarmament development relationship by identifying military spending as an impediment to economic growth and social development, and the arms race as an obstacle to the establishment of a new international economic order.

Yet, the sad state remains that the world military expenditure is increasing every day, and unfortunately even the Third World Countries are getting caught up in the conflagration. Gordon Burck, in his article "NIEO & the Arms Race" (Gandhi Marg., Sept. '81) says– "Third World share of world military spending increased from 5% in 1955 to 20% in 1979, and in 1977, the developing countries, for the first time, spent a larger fraction of GNP on the military than did the industrialized countries (5·9% vs 5·6%)."

Till we continue to emulate highly competitive growth patterns based on energy intensive centralized systems and allow S & T to follow that path, the consequent war armament face is inevitable. The new world international edcation order demands that without waiting for the other countries to follow, the bold amongst the nations take to the path of Science for Peace.

Devendra Kumar

from the labs

In this column, we invite techniques evolved in the labs of India as can benefit the villages and help in creating a new order.

More Fodder From Jawar: The Indian Council for Agricultural Research has invented a new variety of jawar which would yield 70% more fodder than the usual one. 3000 quintal seeds of this variety had been distributed in different states last year. There is a heavy demand for this variety in Maharashtra, Gujarat and M. P. This invention may help in increasing milk production in India.

New Farming System: The Indian Grassland and Fodder Research Institute, Jhansi has developed a new farming system, which would add new dimensions to the renewable biomass energy production system, besides providing animal feed. The coppice farming system could produce five to ten tonnes of firewood per hectare per year and three to four tonnes of dry forage per hectare. This package of plant production system would ensure efficient use of marginal and sub-marginal sites including the village community grazing lands. This would also obviate use of cow dung cakes for burning and return the same to the agricultural land with the substitution of this system for multiple uses.

New Wickless Stove Designed: The Indian Institute of Science, Bangalore has developed a wickless stove with a 60 percent thermal efficiency and 8 to 9 hour flame per litre of kerosene. Its design combines the advantages of a pressure stove with those of a wick stove while avoiding their disadvantages and gives a higher temperature. The possibility of tank burst and other such accidents associated with the pressure stove is considered remote in the new stove fabricated from local and cheap materials to keep down costs. The kerosene tank is built away from the burning area but the kerosene is led into the burning area which is designed to achieve maximum burning without loss of kerosene vapour. The stove needs a short pre-heating with spirit.

Fruits of Urbanization: Dr. S. Kameshwaran of Madras has carried out an extensive survey on noise pollution in Madras, Coimbtore, Madurai, Cochin and Trivandrum. The main areas of survey were textile mills, automobile factories, oil, chemical and fertiliser industries. The conclusions of survey are shocking:

* One out of four factory worker is turning deaf due to noise population.
* Ten percent police and vendors in these cities are also victims of deafness.
* In an average Indian factory worker, deafness is found at the age of 50-52 years. However, in the next generation of workers, this age limit will go down to 40-45 years.
* Cases of such deafness are not found in any age group in the quiet district of Nilgiri.
* Deafness caused by noise pollution is beyond repair; neither surgery nor hearing aids can be of any help. Noise pollution is also shown to cause heart ailments, hypertension and even blindness.

A New Farm Technology: Sadguru Seva Ashram has brought a new technology to path in Banda district. In this method known as Nutrient Film Technique (NFT), plants derive their nutrients from carefully regulated slim water channels carrying a water borne solution of nutrients. For more information, please contact. Bhartiya Agro Industries Foundation, Kamdhenu, Senapati Bapat Marg, Pune-411 016.

Fire Proofing of Thatched Roofs: Concoction that makes thatched huts fire proof is prepared out of pionic acid, salicylic acid, hydrochloric acid, nitric acid, sulphuric acid, minerals, silicates, neutralisers and stabilisers. The cost worked out is between Rs. 100 and 150 per hut. Cantact: Mr. B. C. J. Koppoola Rao, Vijayawada, Andhra Pradesh.

100% Bio Gas Engine: Bharat Heavy Electrical Ltd., Ranipur, Hardwar, U. P. has modified a five Horse Power conventional petrol engine to work as a bio-gas engine. The modification has been highly successful and the engine is delivering an output of 2·5 horse power at the rated speed of 3,000 r.p.m. while operating entirely on bio-gas. A multi-cylinder spark ignition engine is also being converted for operation with hundred percent bio-gas.

Dry Battery Cell with Cowdung: The Central Institute of Agricultural Engineering, Bhopal has developed a dry battery cell with cowdung that can be used to run transistor and radio sets. The cell is made of a plastic container 40 millimetre wide and 50 millimetre deep which can contain 60 grams of electrode type carbon and zinc besides cow-dung. One such cell can give a potential of 0·8 volts, which can be augmented with addition of a little salt to the cow-dung.

RESEARCH IN BIOGAS TECHNOLOGY & UTILISATION

Some recent Trends in India : Part I - The Process

- M. A. Sathianathan, C. S. V.

[A review of the papers submitted at the National Seminar on Biogas Technology, Sponsored by the UNDP/ICAR held at the Punjab Agricultural University, Ludhiana from 9th to 11th July, 1981. The names in the brackets indicate the sources. To be continued the next issue.]

All over the world, there is an increasing interest in the development of alternate and renewable sources of energy (Vashistal). Among these sources, biogas offers itself as a viable alternative, as the development of biogas technology and its utilisation in India (Patel, Khandelwal) and China during the last decades have shown. The progress in the adoption of this technology on a wide scale has been more rapid in China due mainly to a number of socio-economic and political factors which have shaped and guided the implementation policy for the technology (Moulik). Other countries are also developing and introducing this technology in their rural areas. e. g Egypt, (El Halwagi) and Philippines-(Alviar).

In India, the past decade has seen a spurt in research in the microbiological and biochemical aspects, process engineering, plant design and product utilisation. Some studies in the socio-economic aspects involved and designs for a biogas energy system have also been reported.

Microbiological & Biochemical Aspects : Anaerobic digestion of organic substances is essentially a two step biological process where the first step, the acidogenic is faster than the second step - 'the methanogenesis'; it results in accumulation of acids, which, when exceed certain levels, inhibit the flora. Lab level studies conducted at the BERC, IIT, Delhi (Ghose T. K. and Amit Bhadra) show that the phase separation through the multi-reactor systems, four for the acidic phase and one for the methanogenic phase, increased the over all efficiency of the system. Available organic carbon in the first phase is converted to volatile fatty acids. By increasing the acid level in the methane phase digester, methane formers are allowed to build up, resulting in increased participation of co-enzyme M. The total result is that volatile solids reduction and methane formation is 1·5 times and total energy recovery is twice that of a single phase digester using cowdung as a substrate. Further studies using the same multi-phase reactor using a mixed substrate of cowdung, algae, water hyacinth and untreated rice husk (in the proportion 1 : 1 : 1 : 0.9) gives 2-3 fold increase in methane production compared to cowdung alone in a single phase digester. (Ghose T. K. and Debabrata Das).

In a study made at the IARI (Sushil Kumar & T. D. Biswas), gas production has been found to vary significantly with differnt animal excreta having close C/N ratios. For example, pig dung and poultry excreta having close C/N ratios 13 and 15 respectively, differ widely in gas production which shows that C/N ratio alone does not form a dependable basis for the evaluation of the rate and quantity of biogas produced. However, the C/N ratio is an important factor in predicting the success or failure of anaerobic decomposition of organic matter.

This study also reveals that, in general, in the nutrient element concentration in the dried feed stock samples and the corresponding dried digester residue, the concentration of N/P/K as a percentage of dry weight was higher in the residue than in the undigested material, that is, the nutrient elements are conserved during the digestion and gasification of cow-dung and other organic materials.

In another study conducted at the IARI (Chhonkar), it is reported that in fermenters receiving cattle dung, camel, pig and horse dung and poultry excreta studied with reference to the time of digestion, the population of fungi and actihomycetes was found to be negligible. Anaerobic bacterial population showed an increasing trend upto the 20th day of fermentation of all the animal excreta and thereafter, it declined.

In the second part of the same study conducted with digesters receiving sugar cane bagasse, ground nut shell, wheat straw, paddy

straw and water hyacinth, all ammended with cow dung, it was found that the maximum number of cellulose hydrolising bacteria was present in the water hyacinth treatment, whereas their number was lowest in sugar cane bagasse and groundnut shell.

Digestion of Water Hyacinth and Other Aquatic Weeds: The suitability of water hyacinth (W. H.) as substrate for anaerobic digestion to produce methane is supported by other studies. Experiments conducted at RRL, Joroat (Unni et al) show that: Using an essentially unagitated digester and powdered W. H. –

1. A steady rate of bio-gas production could be achieved in semi-continuous operation.
2. The gas production rate increased with the increase of influent volatile solids (VS) concentration and decrease of Retention Time (RT). On the other hand, VS digestion decreases with the decrease of RT and increases with the increase of influent VS concentration.
3. Methane content of the gas increases with the increase of RT.
4. The most significant finding was *the linear relationship between VS loading rate and gas productivity rate as* expressed below:
   Gas productivity (litres/litres digestion volume/day)
   = 0·1217 × loading rate (grains/litre digestion volume/day).

The Centre for Water Resources Development and Management, Calicut, studied the growing of aquatic weeds for waste water treatment, with subsequent generation of bio-gas. It was found (Abbas S.A. et al) that Water Hyacinth produced 13.04 litres/gm/day of biogas. Another aquatic weed which could perhaps find practical application for generation of biogas is the water fern (*Salvinia molesta*) which produced 7 39 litres/gm/day. From the point of view of nutrient removal for waste water treatment Hyacinth and Alligator Weed (*Alternan thera Philoxeroides*) were the most suitable as they absorbed not only Nitrogen, Phosphorous, Sulphur, Calcium, Magnesium, Potassium, Sodium and Iron, but also Manganese, Zinc, Copper, Cobalt, Silver, Strontium, Lead and Cadmium. W.H also absorbed Nickel and Phenol. This opens out the possibility of setting up economically self-supporting waste treatment-cum-biogas-manure generation plants to treat urban wastes to produce recycled water suitable for agricultural and industrial purposes.

(To be continued)

THE SUN BASKET

Ravindra, CSV.

The world is on the threshold of an unprecedented energy crisis. As always, the poorest man is the worst victim of this crisis. The rising cost of kerosene and rapid rate of felling of trees have drastically reduced the already scarce quota of fuel accessible to him. The sun basket is an answer to the 'poor man's energy crisis'. It is a simple and cheap device used for cooking food with the help of solar energy. The design of sun basket described in this article has been originally prepared by Sri M. Von Oppen of ICRISAT, Hyderabad. Several such baskets have been prepared and tested at CSV.

Advantages of Sun Basket: (1) Makes use of the incident solar energy which is otherwise wasted. (Energy incident on 5 sqm. of land per annum is equivalent to potential energy contained in 1 ton of oil.) (2) Cheap and durable – a basket costing Rs. 50 to Rs. 75 provides free cooking for about eight months a year. The minimum life of basket is two years. It can be reused after replacing the wornout reflecting paper (3) Helps in preserving the ecological balance by alleviating the pressure on limited forest resources and preventing loss of valuable manure in form of dung cakes. (4) Makes use of locally available resources and skills (5) Saves the time spent in collecting fuel. (6) Provides safe, uniform heating and hygienic cooking with no hazards of smoke and fire.

Principles: The sun basket is essentially a paraboloid curve with its inner surface being reflecting. When the sun's rays are incident at any points on this surface, they converge and focus at the focal zone. On a clear sunny day, solar power is sufficient to provide an equivalent of 1 kW of energy to a cooking pot.

Materials: (1) Graph paper (Ordinary) 70 cm × 80 cm – 1 no. (2) Card Board sheet 70 cm × 80 cm – 1 no. (3) Ply wood piece 100 cm × 90 cm – 1 no. (4) Rings with screw tails (20 cm) – 2 no. (5) Sand or rubble – 1 cu.m. (6) Cement 2 bags, (7) Bamboo Basket (Bamboos 1½, iron wire 100 gm.) (8) Paper pulp - 5 kg. (dry weight) (9) Methi flour – 250 g., (10) Wheat flour 2 kg. (11) Silver paper 40 × 60 cm^2 – 2 sheets or Polythene coated with Alumina vapour (60 – 80 g.) (12) Fevicol/rubber solution (for polythene sheets) or starch paste (for silver paper). (13) Pair of scissors, screws, nails, knife, old newspapers/4 m. cloth for mould cover.

Method of Construction:

A. Determination of parabola: For constructing a parabola, use the equation $x^2 = 4$ PY, where x and y are co-ordinates and P is the distance from the bottom of parabola to the focal point.

Experimentation has shown that P = 20 cm gives the best results. Hence using the equation $x^2 = 80$ Y, plot the point on the following coordinates on a graph paper and draw only right hand side of the continuous curve passing through these points – (See fig. 1)

X	12.6	20	28.3	34.6	40	44.7	49.9	52.9	56.6	63.2	69.2	74.9
Y	2	5	10	15	20	25	30	35	40	50	60	70

From this paper, trace the curve over a cardboard sheet and out off the shaded area.

B. Making and application of plywood frame: Place the cardboard piece over plywood sheet so that the line '*ab*' runs exactly along the perfectly straight side of plywood and at least 30 cm of space is left free on plywood sheet beyond point '*a*' (fig. 2) Draw line '*ac*' on the plywood sheet and cut smoothly with a saw. Put two rings with screw tails into the front edge of plywood between the corners '*a*' and '*d*' and a nail or screw outside the ring near corner '*d*' such that an iron rod or pipe (1.5 cm thick) can easily pass through both rings and is stopped by nail or screw at '*d*'.

C. Construction of mould: (See Fig. 4) Plant the iron rod perpendicularly in the ground on a fairly even surface leaving about 90 cm. of it above the ground. Test the perpendicular position by means of a string with a weight attached to it. Hook the plywood frame on top of the rod so that it swings freely around the rod and remains a few centimetres above the ground. Fill up the space below the frame by means of stones, sand or similar material, taking care that the free motion of the frame is not obstracted. Leave two to three centimeter of open space below the frame. Pour cement mixture of the right consistency over it, smoothen by slowly rotating the wooden frame to impart a perfect paraboloid shape and allow to dry. Avoid crack formation. Sprinkle water for curing. Many baskets of various sizes can be prepared from a single mould.

D. Construction of Sun basket: After drying of the mould, prepare a bamboo basket which will fit exactly over it. Fix two parallel, thick arches of bamboo around the basket so that the basket can move freely

CONSTRUCTION AND USE –

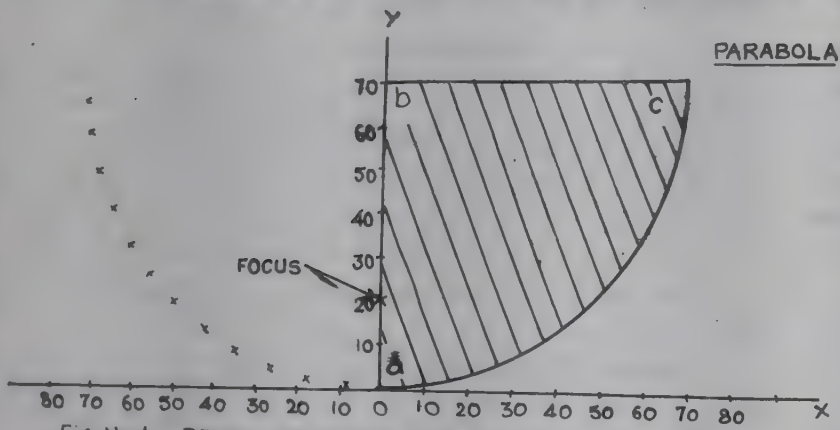


Fig No 1. DRAW A PARABOLA ON A GRAPH PAPER AND THEN ON A CARDBOARD.

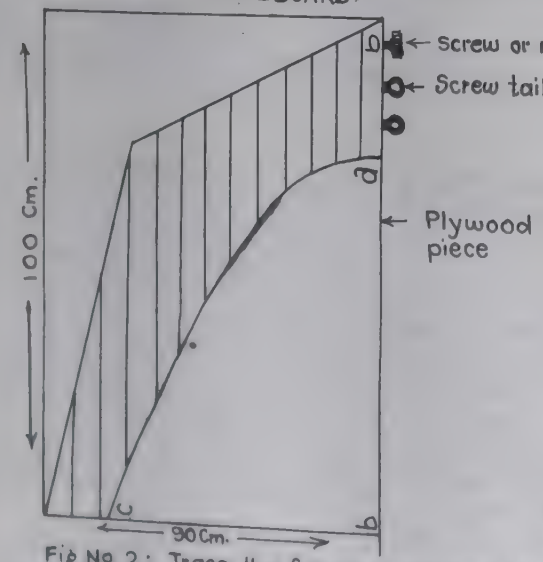


Fig No 2: Trace the figure on plywood and cut out the shaded area.

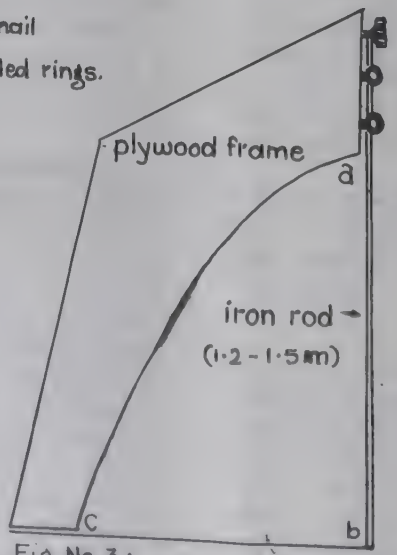


Fig No. 3: Hook the frame over the iron rod.

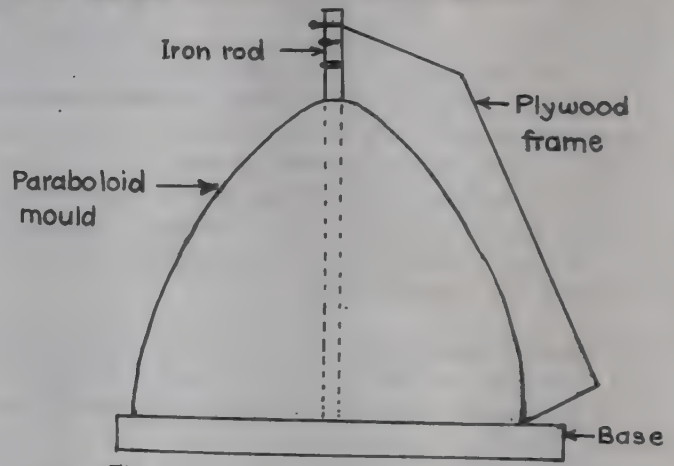


Fig No. 4: Construction of Paraboloid mould with the help of plywood frame.

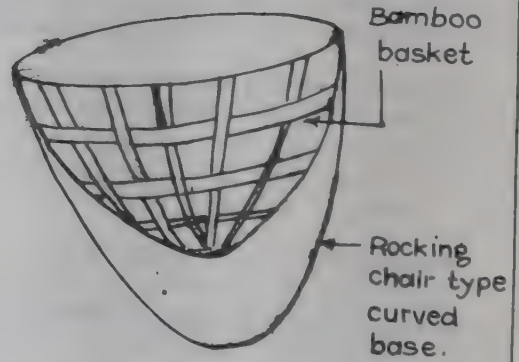


Fig. No. 5:– Preparation of Bomboo basket

OF A SUN BASKET

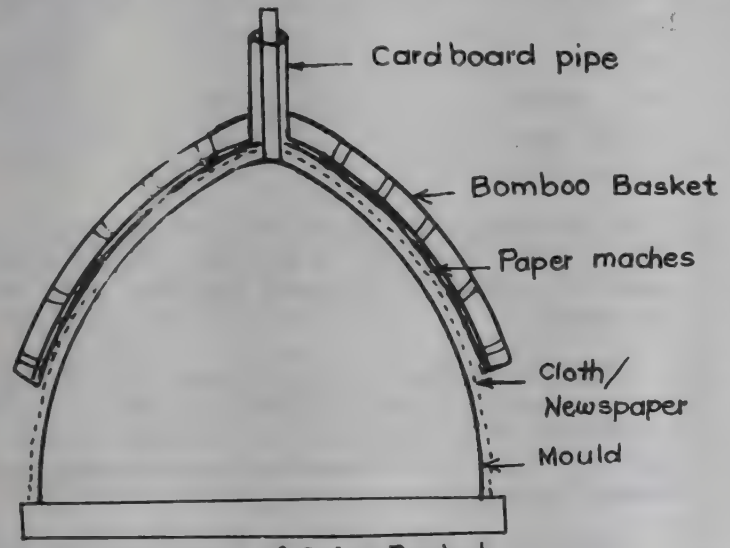


Fig No. 6 : Construction of Solar Basket.

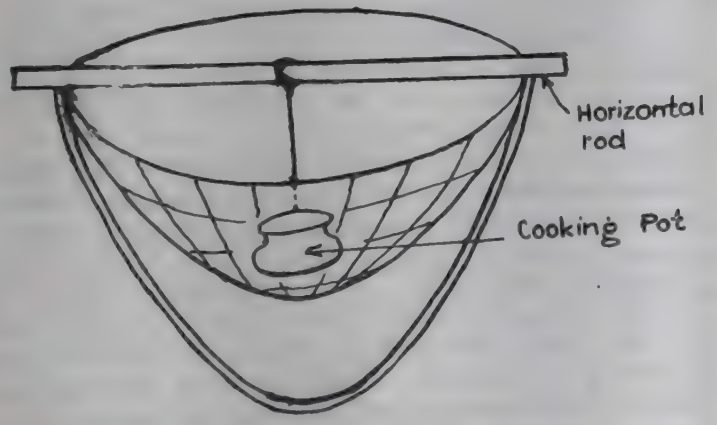


Fig. No. 8 : Using sun Basket (b)

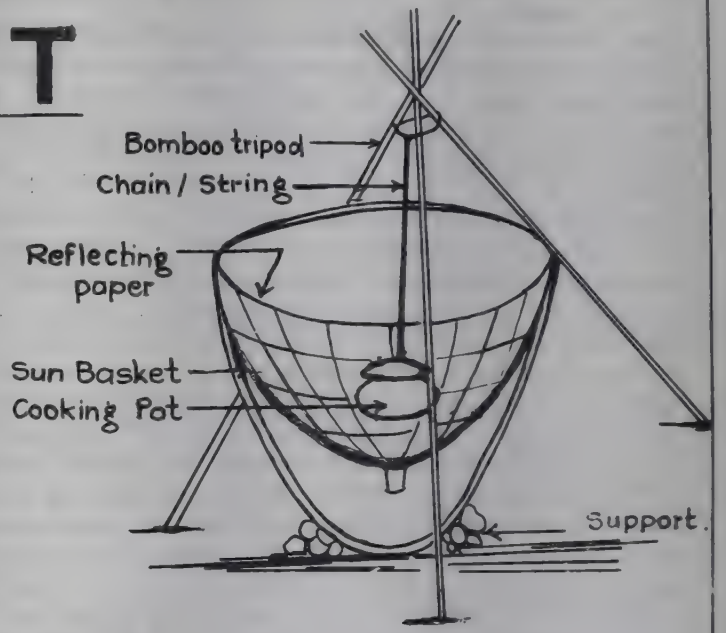


Fig. No. 7 :- Using sun Basket (a)

FOR FURTHER DETAILS, PLEASE CONTACT :-

1) Centre of Science for Villages
Magan Sangrahalaya, Wardha - 442 001.

2) Shri M. Von oppen
International Centre For Research In Semi-Arid Tropics (ICRISAT)
Hyderabad.

3) M/s Chemicoat Industries Ltd.
Kalali Road, Ataldra,
Vadodara - 310 012.

} Suppliers of polythene and aluminium sheets

on their support. This will form a curved stand like the feet of a rocking chair. (See fig. 5). Prepare a thick starch paste using 250 gm. of wheat flour and allow it to cool. Mix together the pulp, prepared from 5 kg. waste paper or banana fibre, 1·75 kg. of wheat flour, 250 gram methi flour and the starch paste. Prepare a homogenous mixture (paper machee) by thorough mixing. Cover the mould by means of a cloth of the same shape and size. Tie the cloth to the mould by means of iron wire, Sheets of old newspapers soaked in water can also be employed instead of cloth. Apply the paper machee in form of a single uniform layer of desired size (about 1 to 2 centimeters thick) over the cloth or the newspapers. Place a light hollow pipe made up of card board or similar material over the iron rod so that its lower end is well embedded in the paper machee. Allow the layer to dry for 1–2 days. Place the bamboo basket over the layer and press gently. Apply paper machee at the inter spaces between the layer and the basket and specially at the point of contact of the hollow pipe with paper machee. (See fig. 6). Allow it to dry completely (for about three to five days). After complete drying, lift the entire basket as a one piece off the mould. Cut the silver paper or laminated polythene paper in appropriate shapes and sizes and PASTE CAREFULLY by means of starch paste in the former and with fevicol or rubber solution in the latter case. AVOID WRINKLES. Apply a thin coat of bitumen dissolved in kerosene or any other water proofing material on the outer side of the basket.

How to use the Sun Basket: (1) Place the basket on the ground facing the sun. (2) Observe the shadow of cardboard pipe below the basket. As the pipe is directed exactly along the axis of the basket, the rays casting the shadow of the same size and shape as of the pipe, would mean exact focussing. Arrange the basket to obtain such an effect and fix it in that position by placing stones or other supports below the basket. (3) Blacken the outer surface of the cooking vessel (for maximum absorption of solar energy). (4) Suspend the vessel in the basket by means of a chain or a string so that it remains in the focal zone (about 8 centimeter from the bottom in this design). The exact location of the focal zone can also be found out by placing our hand at different depths of basket and feeling intensity of light at these positions. The intensity is maximum at the facal zone. (5) Fix the other end of the chain or string to a bamboo tripod placed above the basket or to a horizontal frame or rod placed at the upper end of the basket along with its diameter (See figs. 7 and 8). (6) Change the position of basket after every half an hour in accordance with the changing direction of the sun.

Performance of the Sun basket: The performance of the basket at Hyderabad and Wardha is as follows:—

	Hyderabad	Wardha
Heating 1 lit. water to its b. p.	5 mts.	10 to 15 mts.
Rice ...	15 ,,	25 to 40 mts.
Dal ...	25 ,,	45 to 60 mts.
Steam pudding ...	45 ,,	Not tried
Chicken curry ...	20 ,,	,,
Soft vegetables ...	Not tried	30 to 45 mts.

Cakes, bread and many other food items can also be cooked in the basket. Frying is possible in large size efficient baskets. The performance is subjected to variation depending upon the season, time and location.

Instruction for Use: (1) Avoid looking into the basket with bare eyes. (2) Invert the basket immediately after use to avoid damage of reflecting paper by wind, water or deposition of dust. (3) Avoid contact with water. (4) Always keep the reflecting surface clean and shining. (5) Avoid rough handling.

Limitations of Sun Basket: (1) Useful only on clear sunny days. (2) Cannot be used for preparing chappaties.

Further Experiments: (1) A deep solar basket with $P = 10$ cm is also found to be efficient. For preparing it, follow the same method using $x^2 = 40y$ as the equation of parabola. (2) A window of suitable size can be cut above the focal zone. The pot can be placed over two small bamboo strips fixed just below the focus, parallel to the rocking chair type stand of the basket. This arrangement would prevent exposure of eyes to the shining surface of basket and facilitate placing and removal of cooking. (3) Prepare a basket of paraboloid shape by closely weaving thin strips of bamboo. (It is an ordinary household basket with an exact paraboloid shape). Fix the rocking chair type bamboo stand to this basket. The inner and outer surfaces of the basket are then smoothened by applying layers of mud and cowdung. Finally apply a layer of cloth ash impregnated with oil. Paste the reflecting material on the inner surface of the basket. This basket, though less sturdy, will be more economical.

WINDOW TO THE WORLD

Science for Villages is not an isolated effort. It is a part of a world-wide movement of A. T. Here is an account of the ideas and activities of the birds of same feathers from overseas.

Solar Energy Storage – A group of Japanese scientists have repored development of a substance which can store solar energy efficiently and can also be easily transported. The new substance is a synthetic material composed of norbordience, methyl base and cyanobase. Norbordience is extracted from dicyclopentadiene which is found in crude oil. The substance is a yellow crystal in its pure state at normal temperature but changes form as it absorbs solar energy, although its temperature remains unchanged. It stores 92 kilocalories of energy per kilogram. With sunlight falling on a level area one square metre in size, it is stated that it can store about 85,000 kilo calories a year. To draw energy from the substance, a minute amount of silver is placed in contact with the material. It can be used for a number of times because it returns to its original shape after releasing the stored heat. It is also possible to draw electric energy from the substance.

Conversion of Solar Energy to Chemical Energy : The conversion of solar energy to chemical energy could be facilitated by the use of special photo-anode materials. Such conversions could be catalysed by metal-bonded complexes-organo-metallic compounds or other substances that can achieve highly specific catalysis under milder conditions than those achievable with thermal catalysis. These conclusions have emerged from the research work initiated by Dr. Mark Wringhton of the Massachusettes Institute of Technology. Catalysts tried out until now include trimethoxysilyparaquat (related to the herbicide paraquat), fridium hexachloride and platinum hexachloride. The results obtained with these catalysts are encouraging. *[Source – Environmental Science & Technology, April, 1981.]*

Low Cost Windmill from Kenya : In Kenya, a low-cost-windmill used for pumping water from a depth of about 40 m has been suecessfully developed under a UNIDO project. Its design is simple and makes use of the "Hilton link" - the application of a tensioned, discarded auto leaf spring to balance the weight of the pump rod and to reduce the overall starting torque. The windmill was originally designed to bring down irrigation costs of farmers. As the technology is unsophisticated, the wind-mill can be manufactured in a local small-scale industry. In Kenya, the retail price is approximately one fifth that of its imported competitor.

Fungus to Replace Phosphates - Under a research programme at Barbados, a fungus growth, widespread in trees, shrubs, and other plants, may provide an alternative to costly phosphate fertilizers in the tropics. The growth, formed by symbiosis of plant roots and fungus, is called a mycorrhiza. Under the right conditions, mycorrhizas can improve the growth of the host plant. They thrive on low levels of phosphorus produced in the soil by slowly dissolving phosphate salts. Some of the phosphorus obtained by the fungus is transferred to the plant, which thereby receives more than what it would receive without them. It is suggested that the vasicular – arbuscalar type (VA) mycorrhizas could play an important role in tropical agriculture. One of the problems that will need to be overcome before the fungus is widely adopted is the development of a means of culture. Presently the fungus will only grow together with a suitable host plant. *[Contact : Dr. Robert Black, Botanist, Uni. of West Indies.]*

Village Gas Plant – National Energy Administration, Thailand has developed a plant to be constructed with the large clay or cement jars commonly used to store water. Each jar holds about 1.5 m^3 of gas per day. The gas is stored in a small metal drum floting on water. The drum holds about 600 litres and can fuel stove for two hours. The drum refills fast. *[Contact : National Energy Administration, Pibultham Villa, Technical Division, Karatauk Bridge, Bangkok-5, Thailand.]*

THE TREASURE [CONTD.]

[Here is the remaining part of the list of periodicals published in the last issue, and is related to the ideas and actions in the new horizon of appropriate technology which may be of use to our readers.]

* Synerjy: A Directory of Energy Alternatives, P. O. Box 4790, Grand Central Station, New York, N. Y. 10017, U. S. A. * Tripot, Editions d'Utovie, 64260 LYS. FRANCE. * Undercurrents, The Magazine of Radical Science & Peoples' Technology, 275 Finchley Road, London NW 3, U. K. * The Wastebin, Box 14012, Portland, OR 97214, U.S.A. * Whole Earth, 11 George Street, Bringhton BN2 1RH, Sussex, U. K. * Wildcat, Box 999, 197 King Cross Road, London WC1, ENGLAND. * Win. Peace & Freedom through Non-violent Action. Win Magazine Inc , 503 Atlantic Avenue, 5th Floor, Brooklyn NY 11217. U.S.A. * Workforce, Vocation for Social Change, 5951 Canning Street, Oakland, CA 94609, U.S.A. * Alternative Press Syndicate, P. O. Box 775, Madison Square Station, New York, N. Y. 10010–U. S. A. * Associated Housing Advisory Services, AHAS, 5 Dryden Street, London WC2E 9NW, ENGLAND. * Basic Choices, Inc., 1121 University Avenue, Madison, WI 53715, U.S.A. * "Beyond Tomorrow", Dave Straton, Secretary, The E Value Party, P. O. Box 137, Wellington, New Zeeland. * The Bicycle Network, 14 Oak Street, Brattleboro, VT 05301–U.S.A. * Bioconservation, A. C , Vallarta Sur 805 A, Monterrey, NL. MEXICO. * The Bio-Energy Council, 1337 Connecticut Avenue, N.W. Washington, D. C. 20036–U. S. A. * Biomass Energy Institute, Inc., P. O. Box. 129–Postal Station C. Winnipeg, Manitoba R3M 357. U.S.A. * Biotechnic Research and Development, BRAD, 8 Lambert Street, London N1 1JE. ENGLAND. * BIT, 146 Great Western Road, London W11. ENGLAND. * Boston Wind, 307 Centre Street, Jamaica Plain, MA 02130, U.S.A. * Brace Research Institute, MacDonald College of McGill University, Ste. Anne de Bellevue, Prov. Quebec. HOA 1CO. CANADA. * Center for Science in the Public Interest. 1757 S Street, N.W. Washington, DC 20009,U.S.A. * Conservation Tools and Technology (CTT) Association, P. O. Box. 134, Surbiton, Surrey KT2 6PR, U. K. * Creative Recycling Center, Christopher Wahlberg, 4614 Liberty Avenue, Bloomfield, Pittsburgh, PA 15224. U.S.A. * Critical Mass, Energy Project, P. O. Box. 1538, Washington, DC 20018, U. S. A. * Environmental Action Reprint Service, EARS, 2239 East Colfax, Denver, CO 80206 U. S. A. * Farallones Integral Urban House, 1516 Fifth Street, Berkeley, CA 94710. U.S.A. * Intermediate Technology, 556, Santa Cruz Avenue, Menlo Park. CA 94025–U.S.A. * Minimum Cost Housing Group, School of Architecture, McGill University, Montreal, Quebec. CANADA. * National Center For Appropriate Technology Monthly Bulletin, P. O. Box 3838, Butte, Montana 59701–U.S.A. * National Center for Alternative Technology, Llwyngwern Quarry, Pantperthog, Mchynlleth, Powys, Wales. U.K. * New Alchemy Institute East, P. O. Box 432, Woods Hole, MA 02543. U. S. A. * 'Think Tank' Princeton Centre for Alternative Futures, 60 Hodge Road, Princeton, NJ 08540, U. S. A.

NEWS & VIEWS

Self-Annihilation or Progress ?: In the USSR, the military has first priority for high quality steels and plastics, plus first call on the best qualified technicians and scientists. In the U. S., it is concluded that areas with a high dependence on military or arms production facilities have suffered more economic and social distress and dislocation than other areas. In Britain, no less than 52% of total government research and development expenditure is located in the 'defence' industry, compared with 3% in housing. In general, every additional 31 billion of pentagon spending causes a net loss of 11,600 jobs in the U.S. Apart from the jobs question, several U.S. researchers maintain that high arms spending is inflationary.

– Mike George in IFDA DOSSIER, July/Agust, 1981.

Problem Villages: Nearly 2,00,000 villages in the country do not have any means of drinking water and are "problem villages", Mr. Bhishma Narain Singh, the Works and Housing Minister said in the Lok Sabha. These villages were indentified on the basis that they did not have any drinking water facility within a distance of 1.6 km. During 1980-81, only 23,276 "problem villages" were provided with drinking water facility.

How Healthy Are our Children and Mothers ?: Over 60 per cent of rural children in the age group of 1 to 3, belonging to the poor income groups have anaemia, while 40 per cent of children between 3 to 5 years are anaemic. About 15 to 20 per cent women are anaemic at the onset of pregnancy and the incidence increases to 60 to 70 per cent in the last trimester. Anaemia is directly responsible for 20 per cent of maternal deaths and in another 20 per cent, anaemia is a contributing factor. Anaemia in pregnancy is responsible for the high incidence of premature and low birth weights which results in increasing the prenatal mortality and morbidity.

A report from National Institute of Nutrition (NIN)

Solar Cookers at Stores Soon: The Department of Science and Technology has proposed that as a first step to bringing solar energy into the life of the common man, solar cookers will be sold across the counter at departmental stores before the year is out. The Delhi State Industries Development Corporation (DSIDC) is being asked to undertake manufacture of the cooker in Delhi. It will cost around Rs. 500/- each. In Gujarat, where the project has already been launched, the State Government has sold 5,000 such cookers at subsidised rates of Rs. 200/- each and there is a heavy demand for them. A cell is also being formed by the D.S.T. to educate the people into the use of solar energy. The Commission on Solar Energy has proposed that excise duty and sales tax on goods used for harnessing solar energy are to be abolished. Banks are being asked to give low interest loans to individuals or concerns wishing to install solar equipments. The D. S. T. would render all possible assistance to anyone wishing to install an electricity generator from solar energy.

Disappearance of Forests Threatens Developing Countries: Developing countries, including India, which has lost half of their forest area between 1906–1965, are faced with the threat of complete disappearance of forests within the next 40 years if the present annual forest clearance rate of 15–20 million hectares continues unabated. According to a United Nations estimate, 50 per cent of the total land area in India is seriously affected by water and wind erosion. The country is losing six million tonnes of plant nutrients due to annual displacement of about 6,000 million tonnes of fertile soil. In addition, about four million hectares of land is under ravines in the country, the reclamation of which poses a gigantic challenge to the government. Of the 30 major river valley projects in the country, nearly 11.6 million hectares require conservation treatment on a priority basis. Sandy area in Rajasthan has increased by 18 per cent since the early sixties. About 17 million hectares of land, valued at about Rs. 10,000 crores, has already been lost due to disturbance of the Himalaya eco-system. The blind enforcement of and the commercial exploitation under the National Forest Policy (NFP) of 1952 continuing since the British days when forest wealth was exploited for the consolidation of the Empire, has made the life of forest dwellers difficult. Hence, there should be a radical change in NEP.

– Gopa Joshi, Delhi University at the Silver Jubilee Symposium of International Society of Tropical Ecology.

ABOUT US

Parthenium For Manuring: The hazards of the omnipresent 'white top' (*Parthenium hysterophorus*) are too well known. Numerous attempts are being made by government and voluntary bodies for its eradication. The CSV is making a fresh bid in this direction by making use of it for manure. The school children and the unemployed people of nearby villages are being asked to uproot, collect and carry it to our campus where it is converted to manure in over-the-ground aerated tanks using the NADEP method. (For details, please see SFV Bulletin, May 1981). The manure prepared by this method using other waste materials is proved to be of good quality and has a heavy demand. The net gains from a 10′ × 6′ × 3′ tank containing manure from other bio-wastes is about Rs. 950/-. It means that a small family, after short term training and with a very low investment, can earn about Rs. 600/- per tank in three months' time. Thus, employment can be generated using very low levels of monetary investment and technology, without consuming any amount of non-renewable energy and at the same time, preventing destruction of the soil due to the weeds. It remains to be seen whether these benefits will be accured by using Parthenium.

Pilot Plant Studies in Biogas: Experiments at CSV indicate that if the retention time of bio-mass in the digester is reduced from 55 to 20 days, it has a desirable effect on the rate and quantity of biogas production. Hence, by adding 40 Kg. of gobar (instead of 27 Kg.) into a 1 cuM digester (KVIC design), the gas output increased from 38 to 54 cft. per day. In case of the modified Janata plant designed by Shri Navrekar, the gas yield increased from 38 to 62 cft. per day. It is expected that after stabilisation of the process, 50 and 60 cft. gas would be produced per day from 1 cuM KVIC and Janata gas plants respectively. This study, on one hand deletes the need to build larger gas plants for higher gas production and at the same time, explodes the myth that Janata gas plants are mere manure houses, that they are not useful for gas production due to leakage of gas through side tanks.

However, the experiments using the much talked about water hyacinth have not been very encouraging. 70 Kg. of fresh cowdung, when fed into 3 cuM. Janata plant used to yield 100–110 cft. of gas, whereas a mixture of equal quantities of cowdung and water hyacinth (total 70 Kgs.) yielded only 70 cft. of gas per day. More study is needed.

AN APPEAL

It has been a sincere wish of CSV that it should serve as a platform for all workers who wish to use science for the common man, (the lowliest, lost and the last of human beings). Activists– individuals, groups or institutions with such orientation, may have faith in different ideologies. However, we all can join hands on the issue of taking science to where it rightly belongs or from where it should begin i. e. to the neediest people. There are numerous groups working in this direction through various media like health, education, popular science movements or A.T. We need help from all such voluntary groups for making SFV serve its real purpose.

Please send us–

* First-hand experiences in taking science to the people.
* Well-defined problems which could be solved through inputs of S. T.
* Queries about techniques published through SFV bulletin,

Help us in making 'Science for Villages' a medium of meaningful dialogue.

—RAVINDRA

HOW YOU CAN HELP US

* Send for publication your experiments and experience or information in rural technology you come across.
* Enroll subscribers (annual subscription for individuals Rs. 15/- and Institutions Rs. 25/- in India and for abroad, US Dollars 10 and 15 respectively) by sending addresses whom a free sample copy will be sent.
* Solicit appropriate advertisements to help financing this publication (Rs. 1000 for full page, Rs. 500 for half and Rs. 250 for quarter page per insertion).

Please write to: The Editor, Science for Villages, Magan Sangrahalaya, Wardha– 442001, (M.S.) INDIA.

Cover pages printed on Hand Made Paper made from Banan Fibres at C. S. V., Wardha: Printed and Pubished by Ajay Kumar on behalf of Science for Villages, Wardha. Chief Editor: Devendra Kumar, Editorial Office: Centre of Science for Villages, Magan Sangrahalaya, Wardha., Printed by Majestic Printing Press, Nagpur.

Regd. No. WDA–119

VOL. V, No. 4

Jan. 1982

STRENGHTHENING THE WEAKEST LINK

In the January of 1975, when the Indian Science Congress was held in Nagpur, a new note was struck by the Prime Minister in her inaugural address. She drew the attention of the scientific community of India towards their duty for the villages of the country. This was followed in the 1976 Congress at Waltair by the presentation on behalf of the Government, of an integrated rural development plan in which science and technology was to be utilised for the development of the weaker sections of the Indian Community, namely the villages A tradition was established in 1976 that each Science Congress would select a theme for the Conference, applying to all the desciplines of science, to highlight what each one has to offer in the solution of some critical national problem as is relevant to the common people of this land. This trend and stress seems to have become weak with time. This is understandable for it is not easy to orient the powerful current of the established order into a new channel unless the banks of constant moral compulsions are strong.

The trend in the policy of Science and Technology to compete with the most developed countries in what are called the 'frontier areas' has always existed. This naturally leads us to mobilise our limited resources disproportionately into these sophisticated fields. The imbalance between the efforts made for the elite areas and those for the common masses needs constant correction. The veneer of sophisticated science must have a firm base where there is no weakness in the lower strata. If the differential in the strength of the various layers is high and the firmness of the top of veneer is not matched by the strength of the rest of the total system, it may break under the stresses created. This is, probably, what is happening.

About half of our people are having less than the minimum need of 2500 calories of food per capita per day; more than one lac villages out of 5.5 lacs do not have water for the year round. These are indicative that our knowledge of the physical sciences could not solve such basic problems to the extent required. It is true that the riddle is not an easy to solve. On one hand, we are forced to keep pace with the rest of the scientific world in the various fields of science and technology, and on the other, mend the picture of abysmal poverty and ignorance that we have in our countryside. India is sacrificing much of its own national requirements of the common people to be able to keep a valiant fight on the front of equality of the third world with the richer nations, in regard to Science and Technology. The sacrifices being made for this purpose have a distinct altruist ring about it. What is being done in high science is not for self-aggrandisement or to claim place in the super power-hierarchy, but with the objective of trying to bridge the widening gulf that existed between have and have-not nations of the world in the areas of science and technology.

Having said this, it must be hastily added that this urgency of the inter-national imparatives should not be allowed to blind us to our internal necessities. To bring relief from drudgery in rural women's life, to assist the landless poor and other weak sections of society for gaining them semblence of dignity are great challenges. We can do a lot in these fields by applying S & T to reduce their total dependence on the upper classes These are the people who cannot even feel where their shoe pinches (unfortunately most of them wear no shoes !) Therefore, the scientific community should also identify where the weak need to be strengthened and how. Identification of the problems of the poor requires a certain degree of identification of the scientists with the villages. It is, therefore, a very correct policy which has been initiated since 1976 that all S & T institutions at whatever level and in whatever discipline they work must have an interface with the rural economy. Even if only 5 to 10 percent of their resources and energy are properly geared to solve the problems of the 80 percent of our people, it will bring about infinite relief in the situation. It will also sensitise the learned scientists to the heart throb of our less unfortunate brethren May the year 1982 bring these priorities more boldly in the policy of Science and Technology and may they reflect in action through the efforts of the dedicated people everywhere.

Devendra Kumar

from the labs

In this column, we invite techniques evolved in the labs of India as can benefit the villages and help in creating a new order.

New Solar Cabinet Dryer: The Central Arid Zone Research Institute (CAZRI), Jodhpur has developed a number of solar dryers for drying/dehydrating 15-20 kg. of fruits and vegetables like chillies, lady's fingers, potato and ber within 2-3 days. To further improve the quality of the dried/dehydrated products by regulating the temperature and facilitating air circulation more efficiently, the CAZRI has recently designed a new and improved Solar Cabinet Dryer (with basal area 1.68 sqm., Vol. 0.39 m^3), with a provision of auto regulation of temperature. Different trials have shown that the drying rate is faster in the improved version than the earlier models. The cost of making this dryer is about Rs. 500. Materials used for its manufacture are available even in small towns.

Drought Screening at ICRISAT: The ability of sorghum and pearl millet to withstand long dry periods and survive on limited rainfall is a major reason they are staple cereals of the semi-arid tropics, surpassing wheat, maize and other cereals in drought resistance. ICRISAT scientists are seeking to improve these capabilities along with the stability of yield, and thus enhance their value to the small farmers and the villages who depend on these crops for their food. The scientists have developed simple and effective methods that screen for drought resistance of large numbers of sorghum lines by evaluating heat and moisture stress effects on germination and subsequent plant development. This seedling stage technique allows early screening of large number of breeding lines for a promise against drought stress. Other tests are also being developed to evaluate the ability of a variety to germinate and emerge through the soil in conditions of temperature, and moisture stress and where soil crusting may be a problem.

Protein Fodder Without Soil: The Central Food Technological Research Institute, Mysore has started programmes on the cultivation of the protein rich alga-*Spirulina* from rural wastes. The protein from this alga is found to be highly digestible (upto 84 percent). The National Environmental Engineering Research Institute, Nagpur and National Botanical Research Institute, Lucknow are experimenting with biological reclamation of domestic sewage through cultivation of *Spirulina*. A culture of *Spirulina fusiformis* has been attempted by the Photosynthesis and Energy Division of the AMM Murugappa Chettiar Research Institute, Madras on mass scale in open ponds of 20 and 37.5 square metre size, with a water content of 6,000 and 11,250 litres respectively. A suitable chemical medium was used along with digested cattle manure. In these trials, it was found that polyethylene covered ponds gave a higher yield. Biogas effluent at particular concentrations improved algal development. The national Dairy Research Institute, Banglore has carried trials on the utility of *Spirulina fusiformis* (local strains) as a calf starter. The Institute is also assessing the nutritive value of the alga on bullocks. Studies conducted at the Institute have proved that *S. fusiformis* was superior to *S. platensis* (IARI) as a protein supplement because of higher content of carbohydrates. (CSV, with the help of Association to combat Malnutrition by Algo-culture (ACMA), France, is also experimenting cultivation of *S. platensis* at a village near Wardha).

Solar Grain Roaster: Appropriate Technology Development Centre, 15/2 A, Thadagam Road, Coimbtore has built a small grain roaster for drying and roasting ground nuts, coffee beans, vegetables and many other food items with the help of solar energy. The device is simple, efficient and cheap. The approximate cost of fabrication using steel frame for fixture is Rs. 60. Cheaper models with reasonably good life can be prepared out of wood. On a clear, Sunny day, about ½ kg. ground nuts can be roasted in about 1-2 hours. All materials required for this device viz. a used tin, spit like fixture, blackboard paint, aluminium sheet are all easily available.

Semi Mechanised Process for Producing Ferrocement Roof and Wall Elements: A simple and easy way of fabricating ferrocement roofing and wall elements in various shapes, such as folded plates, shells and plain plates, using semi-mechanised process and semi-skilled labour has been developed at the Structural Engineering Research Centre, Roorkee. Folded plates cast using this process have exhibited good load-carrying behaviour, water resistance and resistance to cracking. The equipment is at present being used with male moulds but can be modified easily for female moulds also.

*

RESEARCH IN BIOGAS TECHNOLOGY & UTILISATION

Some recent trends in India - Part I - The Process (Contd.)

- M. A. Sathinathan, C. S. V.

(Part II of a review of papers submitted at the National Seminar on Biogas Technology, sponsored by the UNDP/ICAR and held at Punjab Agricultural University, Ludhiana from 9th to 11th July,1981. The names in the brackets indicate the sources. To be continued in the next issue).

The Temperature & Retention Time : Temperature and retention time are two important factors in biogas production. Scientists at the PAU have devised a method of measuring temperature within the digester using Thermistors (Sohal and Dharampal). Using a modified Chinese digester, the effect of Ambient Temperature (AT) and Retention Time (RT) on the yield of biogas was studied (Vyas et al). The results confirmed the earlier reports that the yield of biogas at each input dose increases as temperature increases, but as the input dose was increased, the corresponding RT decreased, but as a result of this (the decreased RT), the total yield of biogas per kilogram of raw dung also decreased. It was also noted that there seems to be an exponential (rather than linear) relationship between temperature and gas yield.

More detailed work is required to find out the optimum retention time-temperature relationship, as this has a direct relation to plant size. Experiments being conducted at the CSV indicate that it may be possible to effect considerable saving in the construction cost by reducing retention time to 30 days, in digesters using cowdung as feed stock. This has to be evaluated in the context of using the biogas plant as a means for producing both gas and organic manure, through composting the slurry with other organic waste, thereby achieving better pollution control at lower total cost.

It has been found at the PAU (Grewal, Dugga & Rana) that temperature was maintained around 25°C within the digesters, when the mean ambient temparature was around 15°C, by heating the digester using the exothermic heat generated in a compost pile surrounding the top one metre of the digester and putting paddy straw matting on the top of the gas holder.

PART II: TECHNOLOGY & PRODUCT USE

A. TECHNOLOGICAL ASPECTS:

1. Modelling and Simulation : Guide lines for upgrading biogas plant operation practice by quantifying various parameters in relation to the rate of anaerobic digestion process, can stabilise digester environment and help proper operation of plants. An exhaustive evaluation of process stability and control strategies could entail many months of work if conducted on a large scale. Tools of systematic analysis such as modelling and simulation can reduce the time required. This is accomplished by using computer simulation to focus on the important characteristics of the process.

A recent study conducted at the IIT, Kanpur (M. S. Sharma and A. V. S. Prabhakara) has shown that:

1. Simple equations to rationally predict and explain biodigestion can be devised and used with a high degree of reliability.

2. Organic loading and retention time, the two important para meters used for the design of the digester can be thus optimally calculated and used.

2. Design Development: Design development has not received as much attention as it should have.

Agricultural Tools Research Centre, Bardoli, has been concentrating on the development of the dual aspects of gas and manure production and has developed a fixed dome biogas plant (Mohan Parikh) in which the dome is constructed of pre-fabricated concrete sections. Designs have also been standardised for conversion of moveable dome plants to the fixed dome type.

At the Punjab Agricultural University, an Engineering approach of enriching methane content (S. N. Vyas et al) was made through single, double and three stage digesters on a pilot scale in fixed top type plants. CO_2 content of 31.75%, 22.6% and 28.5% have been reported for one, two and three stages respectively.

PAU has also designed small gas-plants in (V. K. Kakkar et al) which the cost of construction has been reduced through conservation

in use of materials, but the scarce materials–cement and steel are used for the construction of this plant. Polyolefine Industries Ltd. (Akola) has fabricated an above ground plant made entirely from black plastic material. A price competitive with that of the KVIC model is claimed. But durability and whether it will withstand photo-sensitisation decay caused by sunlight is yet to be evaluated.

Community Gas Plants have attracted some attention since the Fateh-Singh-Ka-Purva Experiment (Ghate). Chemical Engineering Department of Andhra University made detailed calculations of the gas requirements, gobar availability etc., and has recommended multiple digesters of medium size rather than a single large digester for two systems (Bhaskar Ramchandra Dufal et al), one for generating electricity for running pumps, street lighting and house lighting and the other for providing gas for cooking and lighting.

A design for attaching Community Latrines to a large size gas plant has been evolved by PRAD (Shahzad Bahadur and Gyan Sagar). The design has similarities to a septic tank, and will be found useful where conversion of septic tanks to gas plants are envisaged.

3. Modifications for improved performance: (a) Temperature: One of the constraints in biogas usage is drop in gas production during the cold season due to a fall in temperature. Some studies on the effect of temperature and on remedial measures to prevent the drop in gas production have been made.

A study on the influence of temperature and slurry stratification on Methane Generation (Swaminathan K. R. et al) sums up the temperature effects as follows:

"The slurry has got different layers, ranging from scum on the top to the sediment at the bottom. There exist various temperature profiles and contours at different sections of the plant. The heat of formation of exorthermic nature, the heat transfer by diffusion or conduction, and the inversion of the layers resulting from the density changes arising out of temperature immersion cause the biogas production to become highly complex. The biogas mixture above the slurry being a compressible fluid, add to the kinetic and theromodynamic effects of the system which, in turn, influences the solid gas interface, and subsequently the stratified bottom layer. Hence there is much scope for detailed investigation of kinetic theory of biogas and the heat and mass transfer phenomenon, as influenced by the thermodynamics of the system. [This concept of stratification is contradictory to the findings of another study made by a team of scientists (Reddy et al, 1979) at the Indian Institute of Science, Bangalore, which reported that "The almost complete uniformity of density and temperature inside the gas plant is an unexpected result, for it is generally believed that there is a significant extent of stratification and forms one of the main factors for the dimensioning of the plant." This aspect needs further investigation, especially in cases where non-homogeneous substrates are used].

A study on the effect of ambient temperature and detention period on the yield of biogas in a modified Chinese digester carried out at the PAU (Vyas S. N. et al) reports that —

1. At each input dose the yield of biogas increases as temperature increases.
2. As the input does was increased, the corresponding detention period decreased but as a result the total yield of biogas per kilogram of raw dung decreased.
3. From a calculation of the extrapolated values of yield of biogas, both for observed and theoretical relationship, it is inferred that ambient temperature and yield of biogas can be approximately represented by exponential relationship.

PEOPLES' SCIENCE MOVEMENT IN KERALA

– P. T. Bhaskara Panikker

When the scientific community descends the ivory tower to share its knowledge and skill with the toiling masses, it creates history. This has taken place in Kerala. One of the participants in this process gives its brief account for S. F. V.

In 1957, some eminent popular science writers in Malayalam assembled and formed the 'Sastra Sahitya Samithi' in a modest way. Later, in 1962, a wider association of science writers was formed under the banner of Kerala Sastra Sahitya Parishad (KSSP). After initial experience, the Parishad felt that unless, science is taken to to the villages, social change will not take place. So, from 1967 onwards, it focussed its attention to initiate a mass-based movement to inculcate scientific temper in the villages with the help of hundreds of its committed workers–from university professors to educated unemployed youth.

Programmes: KSSP employed various media like Jathas, mass meetings, dramas, songs and slogans to spread its message. In 1971, a 'Science Week' was organised when thousands of small meetings were held in which the village folk asked questions pertaining to their every day life and scientists replied. About 1.5 lakh people participated. In the 'Science Month' observed in 1973, 12,000 meetings were held involving nearly 5-6 lakhs of people. This interaction with the villages aroused the interest of the villagers and it led to the formation of Grama Sastra Samithis (Village Science Forums) on their own initiative. Initially, 100-150 such samithis were formed. They were either attached to village libraries, to peasants or agricultural workers' organisations or even to primary schools. They made plans based on the needs of the communities and implemented them. The activities varied from holding literacy classes to starting cottage industries. *'Science for Social Revolution'* was the central slogan for all these programmes. A Village Science Academy was formed, but due to paucity of funds, not much head way could be made. The idea was to develop indigenous techniques and to find out the 'real' village technicians so as to learn from them and then evolve new technologies acceptable to the people.

During 1979 and 1980, the Parishad conducted Sastra Kala Jathas (Scientific Dramatic Jatra) in which the medium of folk art was used to convey the ideas of science and technology to the people in an entertaining manner. Apart from hundreds of books, a magazine *'Eureka'* for primary school, another for high school students and yet another for college students are being published regularly. A monthly magazine *'Grama Sastram'* is also published. School and state level competitions are held annually and they evoke tremendous response. In the *'Eureka Test'* held last year, nearly 6 lakhs primary school students participated. It is expected that by 1982, when the Parishad reaches the age of 20, the ideas which KSSP stands for, will penetrate into every village in Kerala.

The Kanfed Story: Kerala Grantha Sala Sangham (Village Libraries Organisation) started in 1945 was the premier voluntary agency led by village youth attending to the intellectual needs of the rural folk. Due to 'political' reasons, the government took control of the organisation and the erstwhile voluntary organisations came under a Control Board. It was felt by the workers that a new organisation run on a popular basis was necessary to look after the non-formal educational needs of the village people. Hence, in June 1977, a new voluntary organisation named Kerala Association for non-Formal Education and Development (KANFED) came into existence. The experienced persons who had organised literacy classes under the Grantha Sala Sangham during 1970–76 joined the KANFED. All the activities of the Sangham are continued by KANFED on a broader way, with particular attention given to imparting non-formal education–particularly among Girijans, Harijans, fishermen, women and agricultural labourers. After the initial training for 3–4 days, the workers go to the houses of the have nots and find out their actual needs. Based on these needs, centres are organised in places most suited to the people-in small sheds or even on the verandahs of houses. Various aspects of village life are discussed and decisions taken which are later implemented with the help of panchayaths and Development department or even independently. Today, at least 1500 non-formal educational centres, each employing one worker are functioning in Kerala on a voluntary basis. Out of the more than 1000 are women. KANFED is the biggest voluntary organisation in Kerala employing such a large number of women workers.

Conscientization: The central idea of non-formal education is to give new knowledge and technology to the needy villagers. After the completion of literacy courses, neo-literates need books on the topics of their interest which they can easily read and understand. KANFED has published 200 such booklets. The topics covered include agriculture, health, nutrition, superstitions, family, alcoholism, biographies, science, technology, savings, village uplift etc. The ideas are conveyed in forms of stories or dramas. Readers and primers for literacy and post literacy classes have also been published. The KANFED publishes a 4-page weekly rural news paper *'Kanfed News'* containing news items of direct interest to rural folks and a monthly wall newspaper-*Nattuvelisham* meaning 'Twilight'. More than 24 issues of this wall newspaper have been published so far and are being used as teaching aids. The techniques advocated by Marx, Gandhi and Paulo Freire are employed by KANFED for conscientization of people.

Kerala has indeed shown the way. Will the S & T institutions from other states follow it ?

For details, write to: Gen. Secretary, KSSP, Parishad Bhavan, Trivandrum, 695001.

KANFED, Saksharata Bhavan, Trivandrum, 695014.

CONVERSION OF LATRINE : BUCKET TYPE TO MINI SEPTIC TANK

(A Simple and cheap method)

Unsafe disposal of fecal matter causing gastrointestinal and other diseases claims a high number of deaths in India. The flush toilet cannot solve this problem due to its high cost, requirement of large amount of water and pollution of the receiving stream. The number of bucket type latrines in urban India equals those employing septic tanks. Apart from the problems of sanitation arising from bucket type latrines, the existence of a class of society which is forced to perform such an inhuman task itself is a stigma on our society. Here is a cheap (cost being 1/3 of that of a new construction) and simple method to convert bucket type latrine to one using a mini septic tank in which the space below latrine seat itself is used as a septic tank.

Materials :

1) Bricks : 650
2) Cement - 7 Bags
3) Sand : 30 cft.
4) Aggregate - 17 cft.
5) Steel : 10 kg.
6) Precast latrine Seat
7) Bent pipe ($2\frac{1}{2}$") - 1
8)

Method : 1. Remove all the construction from the bottom portion except the four walls as shown in the figure.

2. Apply a 6" concrete bed (1:2:4) at the bottom.
3. Build a half Brick wall from all the four sides bonded in old structure for supporting the slab.
4. Cast the cement slab so as to accomodate the latrine seat.
5. Make two compartments as shown in figure.
6. Plaster the walls of septic tank from inside and outside using a 1:3 mortar. (Min. 1/2" thick)
7. Connect a 2·5" dia. vent pipe to the septictank.
8. Use the bottom portion of latrine as a septic tank, fill it with water.

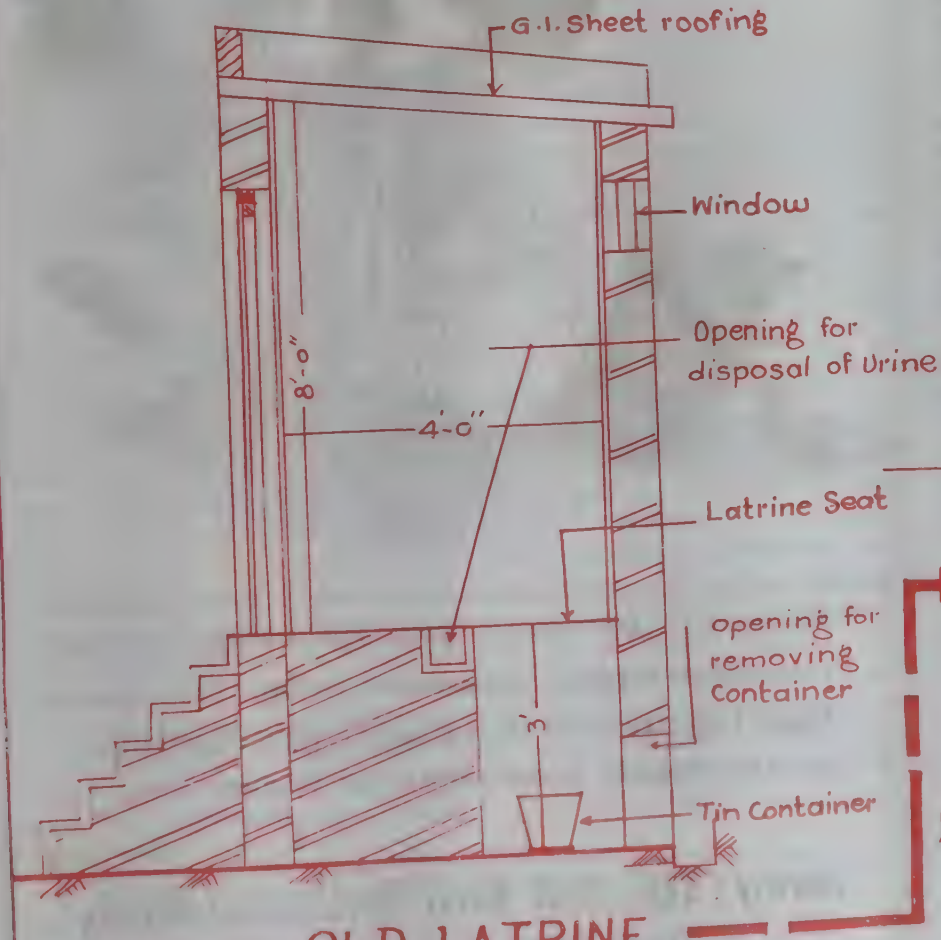
Precaution :- The pipe of seat should dip in the water of septic tank to a depth of atleast 5 inches.

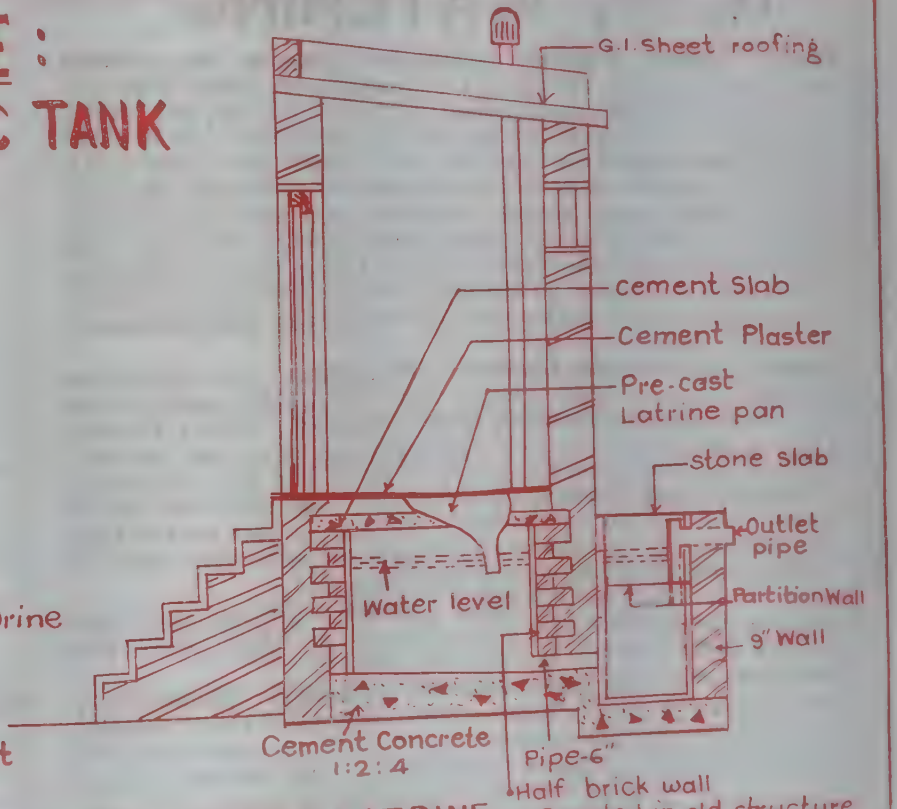
Contact :-
CENTRE OF SCIENCE FOR VILLAGES
Magar Sangrahalaya.
Wardha. (M.S.) 442001.

CONVERSION OF LATRINE :

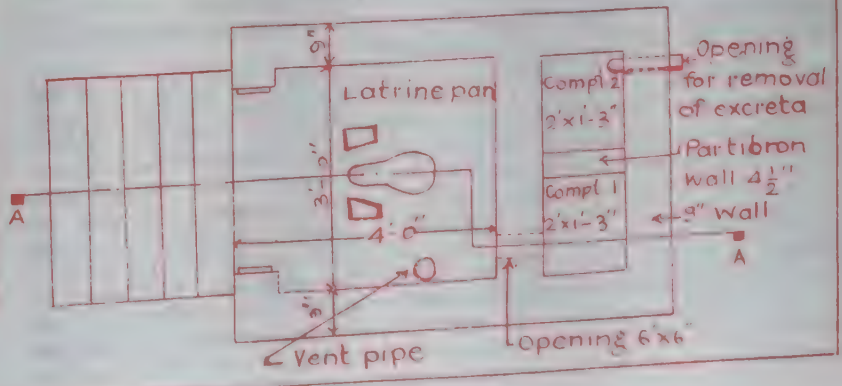
BUCKET TYPE TO MINI SEPTIC TANK

(A Simple and cheap method)





CONVERTED LATRINE



BOOK WATCHING

Village Technology Handbook - (Compiled, designed and produced by Rural Communication Services, 17 St. James Street, South Patherton, Somerset, England). This compendium is laboriously prepared with a view to provide to the people of poor countries an access to the scientific and technical knowledge in a form that both reflects their needs and is assimilable. It provides, in form of loose sheets, information about the activities of contact groups/persons working in the fields of agriculture and equipment, communication, cooperatives, energy, food and crop storage, health care and equipments, housing, research books and periodicals, tools to make tools,and water supply, listed by continents/countries. International organisations working in each country and books/periodicals are also listed separately.

Sanitation In Developing Countries: (Proceedings of a worshop on training held in Lobatse, Botswana on Aug. 14-20, 1980, published by International Development Research Center, Box 8500, Ottawa, Canada, K1G 3 H9, pp. 172). It includes, papers presented at the meeting, summaries of resultant discussions, descriptions of field tests, resolutions and action plans drafted out at the Seminar conducted on the eve of the United Nation's Water and Sanitation Decade in which workers from East and Southern Africa discussed at length the technology, software and training aspects concerning rural sanitation.

Rural Water Supply In Developing Countries: (Proceedings of the workshop on training held in Zamba, Malawi on August 5-12-1980, published by IDRC, address as above, pp. 144).

Monographs On Appropriate Industrial Technology: [Published by United Nations Industrial Development Organization (UNIDO), Vienna.] To focus attention on issues involving choice and application of A. T., UNIDO has published a series of monographs on the following thirteen topics low cost transport for rural areas, paper products and small pulp mills, agricultural machinery and implements, energy for rural requirements, textiles, food storage and processing, sugar, oils and fats, drugs and pharmaceuticals, light industries and rural workshops, construction and building materials, basic industries, and the conceptual and policy framework for appropriate industrial technology.

Manas: A weekly published by the Manas Publishing Co. P. O. Box 32112, El Sereno Station LOS ANGELES, Calif. 90032, yearly. Subscrition 10 U. S. Dollars. This Amerian journal with an Indian name running in its thirtyfifth year is a pleasant surprise for any one who claims to be a sensible and a sensitive reader one concerned with the human aspect of life and with the values governed by it. For the publishers, 'it is a journal of independent inquiry, concerned with the study of the principles which move the world society in its present course, and with the search for contrasting principles that may be capable of supporting intelligent idealism under the conditions of life in the twentieth century.' It envelopes four major fields of human knowledge and creativity-literature, science, religion and education. The presentation is simple, direct, yet pleasant and intelligent.

WINDOW TO THE WORLD

Science for Villages is not an isolated effort. It is a part of a world-wide movement of A. T. Here is an account of the ideas and activities of the birds of same feathers from overseas.

1981 Alternative Nobel Prizes Awarded: The Right Livelihood Foundation, established last year by Jakob von Uexkull wants to provide an alternative to the Nobel Prizes because "most recent recipients have not met Alfred Nobel's criteria of people who 'have best served humanity' and 'made life more precious.'" Hence, the Right Livelihood Award of 50,000 dollars is given every year "to encourage and support those who work on the real problems of the world today." Dr. Mike Cooley, Patrick Van Rensburg and Bill Mollison are the recipients of this Award which was given away at a ceremony in Stockholm on December 9th, the day before Nobel Prize presentation.

Dr. Cooley is the Chairman of the team which developed the well known, Lucas Alternative Corporate Plan which listed over 150 socially useful praducts. The proposals ranged from energy-conserving, low impact technologies to equipments for the disabled, including artificial limb control systems and sight-substituting aids, drawing on the experience in aerospace engineering. The plan aims at protecting the right to work as well as developing products useful to the community at large. Patrick Van Rensburg founded Swaneng Hill School and the Brigade Movement in Botswana and recently established the '*Foundation for Education with Production*' in Zimbabwe. The award recognises his work to develop replicable educational models for the Third World majority. Bill Mollison is the founder of the Institute for Permaculture – "*a complete agricultural ecosystem.*" He believes that a low-energy, high-yielding agriculture based on permanence is a possible aim for the whole world. (For details, please contact:

(The Right Livelihood Foundation, Viking House, Wybourn Drive, Onchan, Isle of Man, British Isles).

From Metropolis To Ashram: Agape Force is a voluntary association of about 350 people, dedicated to bring about a personal and social change in America-through counselling in many jails, detention centres and schools etc., and through identification (collaboration) with several 'grassroots' movements seeking to restructure the technologies, life support systems and resource use in America. They live together on a large ranch in East Texas, where they maintain a training institute, a conference centre and ranch operation. At present, they raise several fruit crops, support a large rabbitry, conduct intensive gardening and cattle management (about 100 head). Several workers are training literacy teams for work both in the slum areas of major U. S. cities and in fields abroad. They support themselves through the house-to-house sale of dynamic teaching/entertainment materials for children.

"THE WORLD AS A WHOLE IS THIRSTING FOR A MODEL OF APPLICATION OF S & T WHICH WILL BRING PEACE AND COOPERATION IN PLACE OF WAR AND COMPETITION." is what Agape Force stands for.

(Contact: Richard Slimbach, P. O. Box 386, Lindale, Texas, 75774, USA).

Hand Pump: An easily serviceable, low cost, non-corrodable hand pump is now being manufactured by Polynergie 1980 Inc. of Canada. The pump, called the **Agrioole**, may be used wherever ground water may be obtained at shallow to moderate depths (1 to 50 metres) and can pump upto 50 litres per minute. The pump is made up of plastic and has been shown to be both longer lasting and less expensive than its metal counterparts. The pump may be run by hand, or adapted to animal, wind, or diesel power. (*For information, contact–Polynergie 1980 Inc. Case postal 639, succursale Outromont, Montreal, Quebec H2V 4 NS Canada.*)

Simple Grain Dryer: Two Thai engineers have designed a simple grain dryer which costs only 320 dollars. It consists of a large wooden bin which holds two tonnes of rice and a fan which blows hot air-from burning rice hulls or oil under the grain. The fan is designed to be run off the 8 horse power engine used in the small two wheeled tractors which are found all over Thailand. It takes five hours to dry a full bin at a cost of 0.6 to 1.25 dollars depending on whether rice husk or oil is used to provide the hot air. Three prototypes have proved successful in dealing with rice, and are now being tried on maize and legumes. (*Contact Address- International Development Research Centre, Box 8500 OTTAWA, KIG 3H9, CANADA*)

Farm Technology: Perennial Polyculture is a bio-technical fix for the area now under till agriculture. This involves breeding and developing herbaceous, perennial, seed-producing polycultures as substitutes for herbaceous, annual monocultures on sloping or rolling land. These plants would be developed by wide crosses and selection of certain wild grasses, legumes, members of the sunflower family, and in all likelihood, other plant families as well. Such an agriculture, based on the principles of a stable ecosystem would be high yielding in seed production, and would drastically reduce the energy cost for pre-planting, cultivation, and irrigation, as well as for fertilizer and pesticide treatment. (For more information contact:

Friends of the Earth Foundation, International Project for safe Energy Paths, 124 Spear St. San Francisco, California-94105; U.S.A.)

Solar Energy Into Electricity: Researchers at Georgia Institute of Technology have taken a major step in the development of solar energy by showing for the first time that the sun's rays can be converted directly into electricity and fed into a power system. Working with a group of researchers from Sweden, the Institute scientists recently used a stirling engine, which uses heat from several sources to convert sunlight directly into electricity. This was then fed into the institute's electrical power supply. Institute scientists envision 'Energy Farms' in which thousands of the Swedish-made stirling engines, each attached to a nine metre-mirror to collect the sun's rays would be linked to generate tens of thousands of kilowatts of electricity. These farms would not be able to replace conventional power plants, but a network of solar power plants would lessen dependence on the non-renewable resources of energy. The cost of the programme now would be too high to compete with standard sources of fuel for power plants, but mass production of the equipment could cut the costs and make solar energy economically feasible within three to five years.

*

"GO TO THE PEOPLE

LIVE WITH THEM

LEARN FROM THEM

START FROM WHAT THEY KNOW

BUILD FROM WHAT THEY HAVE"

– GANDHIJI

卐

NEWS & VIEWS

Paradox of our Age: There is something seriously wrong about a ciety which can produce a level of technology to design and build a oncord, but cannot provide enough simple urban heating systems to rotect the old-age pensioners who are dying each winter of hypother-a ... There is an urgent need for a transcending of the narrow eco-omism which has characterised trade union activity in the past, emonstrating that workers are prepared to press for the right to work n products which actually help to solve human problems rather than reate them. – *Dr. Mike Cooley, Winner of 1981 Right Livelihood Award.*

Technology Transfer Centre: The Polytechnology Transfer Centre as been set up by CSIR to offer a diagnostic service to the industry hrough identification of their scientific, technological and engineering eeds and resolving these by reference and follow-up with the relevant ources of expertise. In addition, they will p ovide technological inputs rural and small scale sectors and to agencies such as SISI, DIC, KVIC etc. (*Contact: Dr. G. T. Gadre, Project Officer, CSIR – Polytech-ology Transfer Centre, Industrial Chemical Lab. Building, V. N. Purav arg, Churiabnatti, Bombay – 400 022*).

Community Gas Plants: Need of the Hour: According to the K & .I. Commission, about 1000 million tonnes of cattle dung is available India every year, of which 30% is burnt directly as dung cakes. If ll the available dung could be recycled properly, the gobar-gas plants an supply fuel for kitchens of 27 million rural families besides other enefits. The Commission feels that five million gas plants can be set-p in Indian Villages to provide energy equivalent to 5431 million itres of Kerosine oil, valued at Rs. 5480/- millions (say Rs. 1000/- er plant). These plants will, in addition, conserve organic manure which is otherwise burnt as dung cakes. The value of the dung so burnt as been estimated at Rs. 460 millions. Out of 100 odd million house-olds in India, only about 20 million own three to four heads of attle required to fuel family sized biogas plants. Even if all these ouseholds set up family size plants, enough cow dung would still be va able to fuel 500 thousand community plants, approximately one in ac village of India. Community plants are thus a practical proposi-ion and have a definite place in our rural economy.

Live and Let Live: The destruction of the environment, the danger of nuclear war and the population explosion have become problems for all. The alternative is either peace or global catastrophe, either understanding or the destruction of most of the mankind. – *Soviet author Lev Kopelav in his address while receiving the Peace Prize from the West German Book Publishers' Assembly.*

Oil Exploration Poses Pollution Threat: One of the most serious pollution cases is caused by accidental oil spills. Ships carrying petroleum and crude and other heavy oils constitute a serious threat of offshore pollution. For, they form a film on the surface of the sea suffocating animals, fish and plankton (which forms food for fishes) living at surface. And once this source material is distroyed, there will be considerable depletion of fisheries around Bombay. This situation requires immediate research study because of the recent intensification of oil exploration and exploitation activities in offshore regions, besides increasing the volume of tanker traffic. The impact of the oil spills, marine diesel oil, light crude oil, fuel oil and light neptha at the entrance of the Madras harbour and adjoining areas have shown that there is considerable potential for pollution. As a biological consequence, the marine fauna and flora inhabiting the intertidal zone have been adversely affected. – *Dr. Daniel, Marine Biological Station of the Zoological Survey of India, Madras.*

Conserving Cement & Power: Production of one tonne each of cement and steel consumes 450 KWH and 4500 KWH of energy respectively. Considerable amount of power can be saved in the country if use of steel and cement is kept to the minimum. It will also conserve mineral wealth since these materials once used in construction are lost for ever. Nearly 45 percent of the cement consumed in building industry can be replaced by energyless materials like lime and fly ash. The modern practice of acceptance of tenders in quasi Govt. and Govt. agencies needs to be changed so that in deciding a tender, the energy requirement should be the only criteria to accept a tender. Thus nearly 25 percent of the cement consumed i.e. 6 million tonnes can be saved, which, in other words means saving all power generated by power stations having a capacity of 340 mW. To encourage innovative designing and construction technology, a ceiling should be laid down for all types of projects for the consumption of cement and steel. For instance, in all residential buildings, the ceiling should be 16 Kg. steel and 50 K. cement per sq. metre of the built up area. – *Dr. M. M. Basole, VRCE, Nagpur.*

ABOUT US

Visit of the Governor: H. E. Shri O. P. Mehra, the Governor of Maharashtra, along with his wife, paid a visit to Taknikipura Campus of CSV and to Magan Sangrahalaya on 10th December, 1981. He was acquainted with the various activities of these institutions directed towards the welfare of the poor. He expressed deep satisfaction for the work done by them and hoped that it would go a long way in helping the poor of the land.

Cycle Trolley developed: The workshop at CSV has developed a simple and cheap bicycle trolley for convenient transportation in villages. The cost is about Rs. 400/-. Its initial field trials are encouraging.

National Camp at Sewagram: A national camp of students and youth for rural reconstruction, jointly sponsored by the Centre of Rural Development and Appropriate Technology, I.I.T. Delhi, CSV, Vishwa Yuwak Kendra and Sevagram Ashram Pratisthan was held at Sevagram during December 21-24, 1981. About eighty participants from all over the country - students, rural development workers, youth and scientists participated in the discussions. The topics were – Economics and Social Issues, Poverty and Disparity in rural areas, Education for rural reconstruction, Technology for rural reconstruction and Political issues in rural development. The deliberations began on 21st morning by the key-note addresses on 'Creating new employment opportunities and the role of youth in rural areas', delivered by Shri Devendra Kumar.

Experiments in Biogas: An Explanation: In the last issue of S. F. V. Bull., we had given an account of experiments being carried out in Biogas section of C.S.V. However, we would like to clarify that in the experiment on the effect of variation in retention time on the rate of gas production, the reported results were based on preliminary studies, and hence, no clearcut conclusions can be drawn at this stage. The results reported in that issue and those obtained thereafter do not vary in substance, although the magnitude of results may vary to some extent when the system is completely stabilized. The preliminary observations indicate that –

(1) The modified Janata gas plant yields more gas per day than its KVIC counterpart of the same digester capacity.

(2) Reduction in retention time (increasing loading rate) increases the gas production.

(3) Fall in ambient temperature effects both plants equally.

We assure our readers to inform them about the progress of these experiments. We also welcome reports of related experiments carried out else where.

EVENT TO COME

Seminar and exhibition on 'S & T for Women'

The Centre for Rural Development and Appropriate Technology at I.I.T. Delhi, proposes to hold a Workshop in second week of February, 1982 on "Science and Technology For Rural Women." The proposed themes for discussion are- Technologies for employment generation, Technologies for reducing drudgery, Aspects for health, nutrition, family welfare etc. Along with the workshop, an exhibition-cum-demonstration will be arranged wherein 100 rural women will be invited to participate along with 50 academics. The Department of Science and Technology, Ministry of Social Welfare, Ministry of Rural Reconstruction, ICMR, IGAR, CSIR and U.G.C. have been contracted and are likely to jointly sponsor the workshop.

HOW YOU CAN HELP US?

* Send for publication your experiments and experience or information in rural technology you come across.
* Enroll subscribers (annual subscription for individuals Rs. 15/- and Institutions Rs. 25/- in India and for abroad, US Dollars 10 and 15 respectively) by sending addresses whom a free sample copy will be sent.
* Solicit appropriate advertisements to help financing this publication (Rs. 1000 for full page, Rs. 500 for half and Rs. 250 for quarter page per insertion).

Please write to: The Editor, Science for Villages, Magan Sangrahalaya, Wardha- 442001, (M.S.), INDIA.

Cover pages printed on Hand Made Paper made from Banana Fibre at C. S. V., Wardha. Printed and Published by Ajay Kumar on behalf of Science for Villages, Wardha. Chief Editor: Devendra Kumar, Editorial Office: Centre of Science for Villages, Magan Sangrahalaya, Wardha., Printed by Majestic Printing, Press, Nagpur.
Regd. No. WDA-119

SCIENCE FOR VILLAGES

THE THREE 'E's

Civilization today suffers from three galloping diseases (i) Ecological destruction, (ii) Energy exhaustion and (iii) Economic imbalances. The three are in a critical stage. Let us see what can be done about them.

Ecological destruction can be gauged even by the number of species of both fauna and flora which have fallen prey to and continue to be threatened by the trend human civilization has taken. For example's the green cover of trees which perform numerous functions to maintain ecological balance has been sadly neglected. In our avarice and short range selfishness, we have tended to kill the very hen which lays the golden eggs. Miss Katherine Mary Heilemann (Sarala Devi) has, in her recent book 'Revive Our Dying Planet' given an estimate of the value of ecological services rendered by a single tree in its lifetime to Rs. fifteen lacs.

All this forces us to think that our production and consumption activities in agriculture and industry must now be judged from their impact on ecology. e. g. the paper on which this article is printed (in 'Science for Villages') was made not by cutting any tree, but utilizing what was "waste' in Nature – the stem of banana plants and other agro-wastes. Human values, public opinions, state polities and inter-national conventions need to be fast educated and influenced to take the right course and all of us must join in this crusade.

Energy depletion threatens to stop the wheels of production and transport, because for the last one hundred and fifty years we burnt the non-renewable fossil fuels and built an economy that cannot sustain any more. Man will have to climb down from using highly concentrated sources of energy to those of low entropy but are renewable. This will unwind the concentration of population, production and power, the trio on which the present metropolitan matrix has developed. Renewable resources can provide us the alternative, but the challenging process needs hard policy decisions. Those at the zenith in the status quo, will have to lose their status and a completely different type of decentralized living and industrial economy of harmony between Man and Nature will have to evolved.

The economic disparities we face today, of one-third population having almost two-third or world production and consumption and the other two-third subsisting on the remaining one-third

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show no trend of harrowing. Because sophistication in technology leads to still more complex, megalomaniac, capital-intensive and centralized systems bringing the profit of production to still fewer hands. The increase of such production is at the cost of social justice. The gap between the poor and the rich widens at all levels i e. community, country and world–where more capital-intensive and size-beneficial production processes are adopted. No amount of good intentions can pave the way to a dream where all are equal and free, if the existence of man through the work he does, depends upon centralist and enslaving modes.

Unless our blinkers are removed, we will be repeating parrot-like that the poor are poor because 'they breed like rabbits' and not see the truth that it is the insecurity of the poor progressively increasing because of the dice loaded in favour of the rich (as production system favours 'big' and 'moneyed') which is the cause of their misery and hence over-population. Thus, Economy of Equality will also need a similar volta facie in the direction to be pursued.

Thus, the balances in three 'E's require a more thorough-going, dispassionate, down-to-earth, but long-range and universal outlook to influence our science policies as well. The recent Science Congress at Mysore could have been a place where these could have been focal issues. Unfortunately, there were very perpherial references to these critical problems of human survival and the thrust was lost in the jungle of generalities. Let us hope that yet India will be able to show the way by offering alternative and appropriate systems for which the world awaits.

Devendra Kumar

from the labs

In this column, we invite techniques evolved in the labs of India as can benefit the villages and help in creating a new order.

Solar Huts: Central Electronics Ltd., (CEL) had put up a solar hut at an exhibition organised by DST. It has been provided with two arrays of silicon photovoltaic (PV) cells, which produce a total of 750 watts of electricity directly from sunlight. The electricity generated by the PV modules is stored in lead-acid batteries. The modules are placed on the roof of the hut so that the 12-square metre of space occupied by them does not involve additional investment. The power generated can be utilised for six tubelights, a table fan, a television set and a water pump. For utilising solar energy on a much larger scale, CEL and Bharat Heavy Electricals Ltd. (BHEL) have jointly proposed to set up a system in a village which would meet the entire energy needs for domestic lighting, running of water pumps, street lighting and small industries, if any.

Research on Artificial Rain: *The Indian Institute of Tropical Meteorology, Pune, 411005* has been conducting extensive research into artificial rain-making. A cloud seeding experiment using common salt is in progress in Sirur and Baramati regions since 1973. In the course of these experiments, a positive increase in rainfall has been observed. The scientists have indentified the "dynamic effect" of salt seeding which is a major break through in warm cloud modification. The technique involves seeding of clouds with massive doses of salt which results in explosive growth of the clouds leading to heavy rains. More studies will have to be conducted for a complete physical understanding of the processes of weather modification before the technology becomes operational.

Low-Cost Glazed Wall Tiles from Common Clay: A good and cheaper substitute for conventional white-ware tiles is now offered by the *Central Glass and Ceramic Research Institute (CGCRI), P. O. Jadavpur University, Calcutta 700032*. The institute has developed low-cost glazed wall tiles with the Gangetic silt deposits of Palta and Howrah (West Bengal) as the starting material. The tiles have adequate crazing resistance and impact strength and conform to the Indian Standard specifications for earthenware glazed wall tiles, and would cost less than half the white-ware tiles. Energy consumption would be about half of that needed for the manufacture of whiteware tiles, as low firing temperatures (950°C) are employed in the process. The institute is now investigating the utilization of Morvi (Gujarat) common clay for producing similar glazed wall tiles.

CFRI Designs a Domestic Chulha: A semi-portable, double-chembered domestic chulha (stove) with a chimney and a somewhat similar but simpler portable chulha have been designed by the *Central Fuel Research Institute (CFRI), P. O. CFRI, Dist Dhanbad, 828108* with the ultimate objective of developing a cheap and efficient coal-fired domestic oven capable of giving practically smokeless combustion. Tests conducted on these chulhas have shown a thermal efficiency of 21% for the semi-portable and 25-27% for the portable chulha. The double-chambered chulha utilizes one chamber for devolatilization of coal, and the other for burning the resultant coke.

RRL-JORHAT ANNUAL REPORT 1980:

(a) Water hyacinth- The laboratory's investigations have shown that good-quality papers and paper boards could be made from water hyacinth. A pilot plant for making handmade paper and boards has been set up at RRL, Hyderabad. The Laboratory also investigated the factors affecting the growth of the weed. Phosphate was identified as one of the most important nutrient factors controlling the growth and multiplication of the plant, with an exponential relationship between phosphate concentration in water and specific growth rate of the plant. In fresh and dried conditions, water hyacinth could be digested anaerobically to produce biogas containing methane. A bench scale biogas generation unit for batch and semi-continuous operation, consisting of a battery of six anaerobic digesters, each stationed in temperature regulated chambers was commissioned.

(b) Agro-based Industries- The laboratory is providing technical know-how and assistance for establishing, on turn-key basis, water-and fire-resistant paper roofing sheets (300 ft^2/day) from paddy straw to Arunachal Government.

(c) Medicinal & Economic Plants- Cultivation of vetiver and *Cymbopogon flexuous var Sikimensis*. The spent-out grass could be used for making quality paper. The know-how for cultivation of *Agaricus bisporus*, a winter species of edible mushrooms, was transferred to some parties in Shillong. A prototype of power-operated chipper developed by the Laboratory for extracting oil from agarwood is an efficient replacement for a pedal-operated crusher and has good potential to improve rural economy.

(d) Technology Transfer- Six processes were released to industry during the year, these related to (i) cement-like product from paddy husk ash. (ii) direct-copy paper. (iii) paper slate, (iv) flow improver (SWAT-104), (v) plastic slate, and (vi) water filter candle.

(*Contact: Regional Research Laboratory (RRL), Jorhat, 785006*)

WATER POLLUTION - A PEOPLE'S ISSUE

Ujjayant N. Chakravorty, Centre of Science & Environment, New Delhi

The rising level of pollution in India's rivers is fast approaching a crisis point. The failure of the Government's control machinery for water pollution has given rise to a spate of people's movements in several areas of the country. Polluted rivers like the Tapti, Narmada and Khan in Madhya Pradesh, Rushikulya in Orissa, Cheliyar and Kallada in Kerala, and Ghatprabha in Karnataka have been witness to a series of popular agitations.

India's rivers serve as a drainage system for the sludge from factories and municipal agencies. The water of 70 percent of them is now unfit for drinking, according to the National Enviromental Engineering Research Institute.

There are five parts per million (ppm) of mercury in the milk of cows feeding on the vegetation near the Kalu river which flows through Bombay's industrial suburbs. Any child drinking a litre of this milk everyday consumes 35 ppm of mercury per week and may retain as much as 0.3 mg of mercury over several months which is far above the safety limit. This is slow mercury poisoning.

Among our major rivers, the Ganga is perhaps the most polluted. Tanneries and textile mills near Kanpur have destroyed all fish life upto five kms downstream of the city, as has been noted in a study of industrial pollution of the river Ganga around Kanpur. Lateral seepage of pollutants has rendered the ground water extremely saline because of the large amount of salt used in tanning.

The Mokameh-Barauni petro-chemical complex in Bihar is another major source of pollution of the Ganga. Fragments of leather from the sewage outfall of the Bata Shoe Factory at Mokameh choke the gills of fishes and render the river water totally unusable for upto six kms. In certain regions of the Hooghly estuary (the stretch of the river where it flows into the sea), the annual fish catch has decreased by 70–80 percent, according to experts at the Central Inland Fisheries Research Institute (CIFRI) in Barrackpore.

"There is not much fish left in the Hooghly river," agrees Dr. T. A. Mamman, a leading fisheries expert of the Goverment of India. It is commonly believed that an estuary cannot be polluted because of the aeration and dilution effect of tidal waves from the sea. But dilution, argues Dr. B. B. Ghosh, pollution expert at CIFRI, is " no solution to pollution." According to him, certain compounds like lignin (which is released by pulp, paper and textile mills) and heavy metals like cadmium and mercury are 'bio-accumulative', which means their concentration keeps increasing in aquatic animals because of pollution.

Riverside cremation grounds have always been the cause of pollution, particularly in places like Banaras. Because of the acute shortage of firewood, unburnt dead bodies are often just pushed into the waters. Bathing in such polluted waters is frequently the cause of rashes and skin infections.

The Government of India promulgated the Water (Prevention and Control of Pollution) Act in 1974 to check and control further pollution of rivers. Under this Act, the Central Board for Prevention and Control of Water Pollution was formed with units in each State, and was given overall jurisdiction.

However, the Board has remained highly ineffective. Out of a hundred odd court cases it initiated, only four of the offenders could actually be penalised. The rest were able to escape through the numerous loopholes the law offers.

"These industrialists have strong political connections", commented a water pollution expert, "and pursuing these cases till the end becomes an impossible task." In many state laboratories, the only piece of equipment is a series of type-writers. The 'laboratories' furnish certified water quality data to the polluting offenders according to the latter's needs. When pollution data can be cooked so effortlessly, the ineffectiveness of water legislation comes as no surprise.

In this worsening state of affairs, there has been an upsurge in people's movements against water pollution. The Indian Aluminium Company (INDAL) in the Belgaum District of Karnataka has been releasing all its effluents into a makeshift tank since it was commissioned 14 years back. Finally, in September 1979, the tank burst under excess pressure and the effluent spilled over, damaging crops, severely contaminating wells and irrigation channels before leading into the Ghatprabha river. The farmers rallied under the local Lok Samiti and launched a satyagraha against the factory management. The factory, in consultation with the State Government, promised compensation worth about Rs. 13 lakhs, but ultimately backed out, offering to give only Rs. one lakh.

Another satyagraha followed last year when the police registered cases against 142 of these farmers. Even the INDAL Employees Union came out in support of the farmers who have now taken the factory and the district authorities to court for renegading on compensatory payments.

A few years back, the Kerala Sastra Sahitya Parishad (KSSP), the famous science popularisation movement in Kerala – organised a mass agitation against the Birla-owned Gwalior Rayon factory for discharging mercury wastes into the Cheliyar river. A high level of mercury content was observed in fishes. The factory's chimneys have been equally deadly. "Ninety percent of the local children suffer from respiratory problems as a result of breathing sulphur fumes emitted by these chimneys", a KSSP activist observed. Persistent demonstrations by local villagers and fishermen led to the closure of the factory which could be re-opened only after the installation of treatment plants. But the colour of the river water has become a permanent brown.

More recently, the KSSP was also instrumental in organising the people to protest against the pollution of the Kallada river near Quilon, Kerala. Padayatras and mass meetings were held for three continuous days before the State Government decided to constitute an enquiry committee.

In 1980, the citizens of Hoshangabad formed a 'Narmada Bachao Committee' to prevent the municipality from channeling all its sewages into the river. Hundreds of town people bathe in the river and the polluted water has caused a spurt of skin and enteric diseases in the town. The Committee has been trying to draw the attention of the municipality, the State Government and the Central Board of Pollution towards this growing health hazard. Till now, it has refrained from organising mass action.

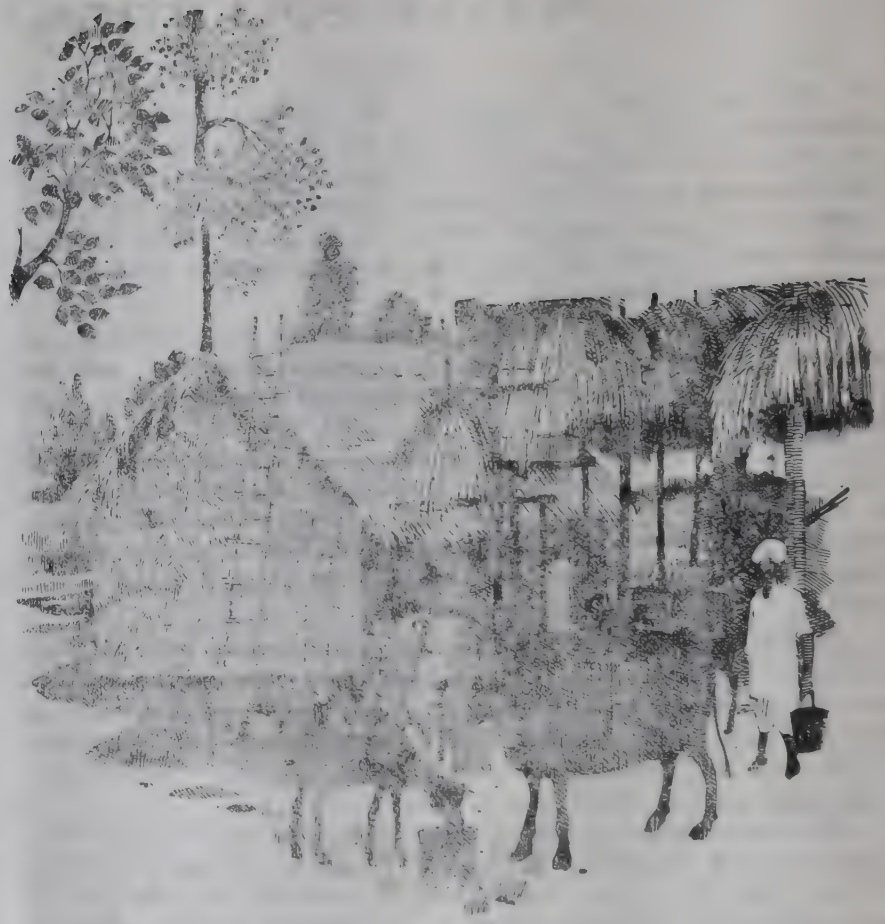
The 'Tapti Bachao Committee', which is led by a group of journalists and local residents of Burhanpur has been compaigning consistently for the past three years against the public sector Nepanagar Mills for dumping their untreated wastes into the Tapti. The mill authorities were taken to court. The result has been the installtion of a Rs. 2·5 crore filter plant to treat the mill effluents.

Doctors of the Gwalior Medical College are currently spear-heading a campaign to draw people's attention to the continued pollution of the Swarnarekha river. The river receives all the sewages of Gwalior town whose 1921-built sewage system was designed to serve 60,000 people, but now serves 10 times that number.

The local fishermen and farmers of Ganjam, Orissa, are up in arms against a chemical factory, Jayshree Chemicals Ltd. (JCL), for dumping all its raw effluents into the Rushikulya river, according to a recent newspaper report. Eight hundred fishermen have been forced to migrate in search for other jobs and the once famous 'Khainga' fish is now extinct. All efforts to control pollution have so far failed. The JCL continues to flout anti-pollution regulations with impunity.

These experiences indicate that water pollution is fast becoming a public issue in the country. The consciousness is growing that it is only through popular action that defaulting agencies can be goaded into discharging their responsibilities.

(Courtesy: Centre of Science & Environment, New Delhi.)



RESEARCH IN BIOGAS TECHNOLOGY & UTILISATION

Some recent trends in India - Part II - : Technology & Product Use (Contd.)

- M. A. Sathinathan, C. S. V.

The third article in the series of a review of papers submitted at the National Seminar on Biogas Technology, sponsored by the UNDP/ICAR and held at Punjab Agricultural University, Ludhiana from 9th to 11th July 1981. The names in the brackets indicate the sources. To be continued in the next issue.

Temperature being an important parameter, its measurement at various levels of the digester can help to understand the digestion process. For this purpose, a method of temperature measurement in biogas digesters (J. S. Sohal & Dharam Pal), using thermistors has been developed at the PAU and a technique evolved to maintain the digester at a temperature higher than the ambient temperature has been devised (Grewal, Duggal and Rana). Digester temperature was maintained at around 25°C, when the outside temperature was less than 15°C. The digester is heated by utilising the exothermic heat of composting. An annular ring one meter wide and one meter deep is dug round the digester top, and filled with alternate layers, 15 cm and 5 cm deep of straw and slurry respectively and each layer was moistened thoroughly. It was found that heat at the centre of the annular heap went up to 70°C (150°F). This heat was used to maintain the digester temperature. Heat loss from the top is prevented by matting made of paddy straw.

(b) **Pressure** : One of the disadvantages in the drumless or fixed dome gas plants is the very high pressure when the tap is just turned on and the difficulty in maintaining a constant pressure, matched to that of the gadgets to be used. A small service holder-cum-pressure regulator for drumless biogas plant has been tried out at the Division of Soil Sciences, IARI (M. C. Jain) A small barrel made of M. S. Sheet collects gas over water. A float valve regulates the feeding of the gas at a steady pressure and the gas is led out from the holder for use. Work is in progress to evolve a simpler and cheaper float valve. But for the cost, this gadget will be very useful for supplying gas at a steady pressure to I. C. engines.

B. PRODUCT USAGE : 1. **Gas Usage** - Some of the aspects of handling and use of the products - gas and slurry, have been studied. The gas is at present used mainly for cooking purposes. The various uses in which the gas can be used without loss of efficiency have to be explored for motive power, process heating etc.

Studies of power generation from biogas plants (B. S. Samaga) have been carried out at the Karnataka Regional Engineering College. Experiments conducted on a single cylinder four stroke, water cooled direct injection, dual-fuel engine showed that the used of biogas as inducted fuel in the existing agricultural engines results in attractive diesel savings and also improves the energy conversion efficiency at almost full load. At lower loads, due to inadequate combustion, the low energy conversion efficiency does not encourage the use of biogas, though substantial saving in diesel is still possible. Simplified calculations show that a 3.5 m^3/day gas capacity plant can satisfy the minimum needs of cooking, lighting and water supply for a family of six members, and will require the dung of from 6 to 10 heads of cattle. For a small dairy farm of 500 litres/ day of milk capacity, a gas output of 4 to 6 m^3/day would be sufficient, depeding on the type of engine used. When conditions are favourable for a community biogas plant, central power generation and distribution can be adopted to meet the above power needs.

2. **Slurry Usage** : The IARI has been conducting a number of experiments in the handling and utilisation of slurry (O. P. Chawla) on its own farms and has studied its use on farms in different parts of the country. As is known, ammoniacal nitrogen concentration is higher in residual slurry (15 to 18%) than in the original dung (5 to 8 percent). This is supported by the results reported by farmers from Gujrat who receive the most crop returns when the slurry was applied directly to growing crops mixed with irrigation water. Farmers from Sangli got even better results when the slurry from gas plants with latrines attached, was fed to field crops.

But direct application is not always possible (as manure application is done at certain stages of the crop cultivation) or the fields may not be close to the gas plants and then transporting liquid slurry is not easy.

(Contd. on page 8)

MACHINE FOR MAKING HIGH QUALITY LEAF & PAPER CUPS

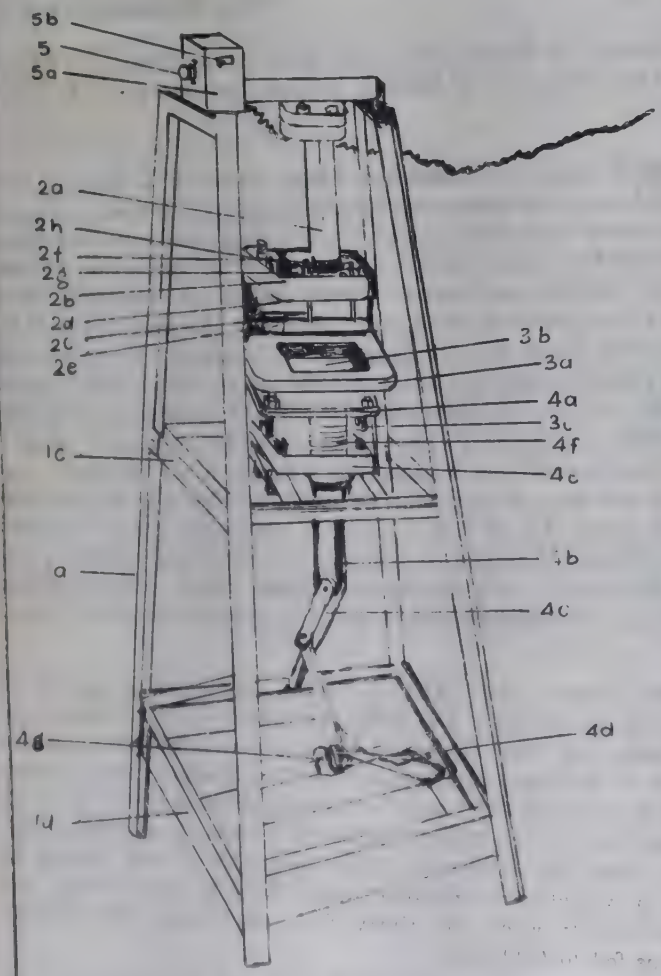


FIG. 1.

CONSTRUCTION OF THE MACHINE

Making the leaf cups :-

1 The energy regulator is set to maintain the male die temperature at above 150C.

2. A leaf of adequate size is placed on the base plate symetrically above the die opening and the foot pedal is pressed down (Fig. 3a) As it lowers, the holding plates keep the leaf in position, leaving small portions at the corners free.

3. The pedal is lowered further until the opening in the base plate fully engages the male die and the leaf is pressed into shape between the male die and the opening, with folds forming only at the corners and with a flange all around the top (Fig. 3b)

4 At this point the force between the die and the opening is slightly less than the intial downward pressure exerted by the springs on the male die.

5. Holding the leaf in this position for a short period (5-10 second) for a thin leaf and 20-30 seconds for materials like areca sheath not only dries and sets the leaf in the shape of the die but also destroys the surface micro-organisms thus making it hygienic.

6. By Pressing on the pedal with a jerk, the bottom plate pushes the die further up into the die box and the edge of the formed leaf tray/cup comes in contact with the cutter blade along the perimeter. The force of this action makes the cutter neatly trim the edges on the formed leaf tray.

7. When the pressure on the pedal is withdrawn, the base plate with the formed leaf tray/cup moves down and the leaf dish is lifted out by hand from the opening (Fig. 3c).

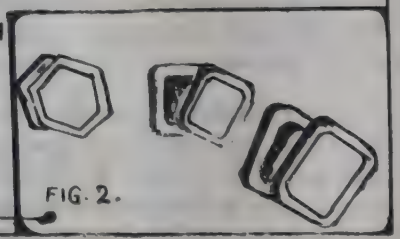


FIG. 2.

LEAF PAPER CUP MADE BY THE MACHINE. (FIG. NO 2)

CFTRI Mysore has developed a simple machine to prepare stronger, more elegant and more uniform dishes of different sizes from leaves and paper at a rate much faster than the conventional method of leaf dish making. In case of flimsy leaves, another layer of leaf paper or polythene may be used for reinforcement. The method is simple. No adhesives are needed. The efficiency and utility of the machine is proved by the trials taken at CSV.

Materials used - Paper, banana leaves, Bauhinia vahilli leaves, areca leaf sheath, Butea Frondosa.

Construction of Machine - It consists of the following main parts - 1. The body frame, 2. The Upper die head assembly, 3. The lower die head assembly, 4. The base plate actuator assembly, 5. The Energy Regulator.
(For details, please refer the figure.)

Operation of the Machine :

(a) Preparation of the leaf - The dry leaf is washed, then softened by soaking in water for 10 to 30 minutes (depending on the type of leaf and its dryness), and dried until it is just pliable (to about 14% moisture); the correct point is reached when the leaf does not crack when folded to 180° across the grain. Any parts more than 3 mm thick are cut off.

(b) Making the leaf cup -

1. The energy regulator is set to maintain the male die temperature at about 150° c.
2. A leaf is placed on the base plate symetrically above the die opening and the foot pedal is pressed down. As it lowers, the holding plates keep the leaf in position, leaving small portions at the corners free.
3. The pedal is lowered further until the opening in the base plate fully engages the male die and the leaf is pressed into shape between the male die and the opening. With folds forming only at the corners and with a flang all around the top. At this point, the force between the die and the opening is slightly less than the initial downward pressures exerted by the springs on the male die.
4. Holding the leaf in this position for a short period (5-10 seconds for a thin leaf and 20-30 seconds for materials like areca sheath and paper) dries and sets the leaves in the shape of the die.
5. By pressing the pedal with a jerk, the bottom plate pushes the die further up into the die box and the edge of the formed leaf cup comes in contact with the cutter blade along the perimeter. The force of this action makes the cutter neatly trim the edges on the formed leaf cup.
6. When the pressure on the pedal is withdrawn, the base plate with the formed leaf cup moves down and the leaf dish is lifted out by hand from the opening.

When using thicker and stiffer materials like areca sheath, the pressure on the holding plates may have to be increased by placing weight blocks above the stopper bushes of the holding plate studs. An operator using the machine can produce upto 250 cups per hour from thin leaves or their combinations, and about 100 cups from thicker materials, as compared to 100 traditional stapled banana donnas and other thin leaf cup. The cost of machine is Rs.3,000/-. A team of one skilled and one unskilled worker can earn Rs.20/day.-

Contact - Centre of Food Packaging, Central Food & Technological Research Inst., Mysore 13

BOOK WATCHING

RENEWABLE SOURCES OF ENERGY–Vol. II BIOGAS : Second volume in a series of sectoral directories on renewable sources of energy, published by ESCAP unber ECDC-TCDC programme (Economic & Technical Cooperation among developing countries). (The other volumes in the same series are Solar Energy (1980), Wind Energy (1981) and Mini Hydro Plants (1981)). It contains not only inventories of experts, institutions and projects undertaken by them, but also technical and economic details of designs, proto-types and hardware developed in ESCAP member countries. (Available from ECDC-TCDC Services, ESCAP Secretariat, the U.N. Building, Rajadamnern Avenue, Bangkok 2, Thailand).

MEDICO FRIENDS CIRCLE BULLETIN : It is a monthly magazine published by Medico Friends Circle, a loose network of workers from medical and paramedical services and others who are working for evolving an alternative to the existing health system in India, one which would be technically appropriate and socially assimilable in the Indian context. Published at 50 LIC Quarters, University Road, Pune, 411 006, Annual subscription Rs. 15/-.

YOUNG SCIENTISTS : A journal of The Society of Young Scientists (SYS), 7/111 Ashwini Block, A. I. I. M. S., New Delhi, published every two months. (Originally published as 'The Point'.) It wishes to change the existing social system by eliminating all non-scientific superstitions to bring an era of peace and prosperity and emphasises the role of scientists in this venture. The journal publishes articles on the research done by young scientists, as well as analyses the various trends in research. The annual subscription-Rs. 10 and 20 respectively for individuals and institutions in India, and U. S. dollars 10 and 20 respectively for abroad.

ALTERNATIVES : A quarterly journal of environmental concern, published by Friends of Earth, Canada, Trail College, Trent University, Peterborough, Ontario, Canada K9J 7B8, annual subscription – 12 U. S. dollars.

A. T. NEWS : A quarterly newsletter published by Centre of Appropriate Technology, Delft University of Technology, Stevinweg 1, Kat. 633, 2628 CN. Delft, Netherlands, free of cost.

ALTERNATIVE SOURCES OF ENERGY : A bimonthly published by Alternative Sources of Energy, Inc., 107 S. Central Ave., Milaca, MN56353 (612) 983-6892. Yearly subscription for foreign air mail – 33·50 U. S. dollars.

SOFT ENERGY NOTES : A bimonthly published by International Project for Soft Energy Paths, Friends of the Earth Foundation, 124, Spear Street, San Francisco, California 94105 U. S. A., annual subscription–35 U. S. dollars. (50 dollars for government/business).

RESURGENCE : A bimonthly working for the resurgence of small nations, small communities and the human spirits, published from Ford House, Hartland, Bideford, Devon, U. K., subscription 7.50 pounds (17.50 U. S. dollars) for individuals and 9.00 pounds (22.50 U. S. dollars) for institutions.

ENVIRONMENT : A monthly published by Helen Dwight Reid Educational Foundation in cooperation with the Scientists' Institute for Public Information at 4000, Albemarle Street, N. W., Washington, D. C. 20016, U. S. A. Annual subscription–19 U. S. dollars for individuals and 30 U. S. dollars for institutions.

WATERLOG : A monthly bulletin on water and sanitation, published by Earthscan, 10 Percy Street, London, WIP ODR, U. K.

BULLETIN OF THE ASSOCIATION OF SCIENTIFIC WORKERS OF INDIA (BASWI) : Published every month at 10, Rajendra Park, New Delhi, 110060.

Biogas :-(Contd. from. 5)

To ovecome these contraints, the following steps have been successfully carried out at IARI :

1. Using slurry as a starter for compost production.
2. Dehydration of slurry by soaking it in raw dust, green leaves etc.
3. Separating the supernatent fluid by passing the slurry over filter beds.
4. Manufacture of organo–mineral fertilisers by enriching the raw manure with urea and phosphate.

Aonther aspect studied was the soil agrregation properties of digested slurry. It is known that among the various organic compounds which have soil aggregating properties is polyureanides, which are synthesised during the preparation of organic (compost) manures. It is reported that wet slurry contains a greater quantity of polyureanide than cow dung. Polyureanide measured as mg. CO_2/gm is 29.8, 52.5, 36.4, and 30.0 for fresh dung, digested wet slurry, digested dry slurry, compost and wet slurry after filteration respectively. Experiments have shown that the use of slurry as manure leads to effective soil aggregation.

CHIPKO NEWS

– Sunder Lal Bahuguna

"CHIPKO" – the mass movement launched to 'Save the Himalayas' from destruction by the short-sighted vested interests needs no introduction. Here, the renowned spokesman of the movement gives his first-hand observations in the foot march from Kashmir to Kohima taken out to spread the message of CHIPKO movement.

Himalaya, which has been described by Lord Krishna in Bhagawad Geeta — "among steadfast, I am Himalaya", in its present shape has proved to be a very feable mountain with a fragile ecosystem. Occurrence of landslides is a common feature everywhere. Dr. K. S. Waldia had warned about the geological changes taking place in this area as early as 1973.

The process of soil-erosion and landslides has been accelerated due to deforestation, which first started in the middle of last century in the lower valleys of Himalayan river. There were clear fellings on the steep slopes, which never regenerated. We could see desert conditions in Chenab valley and in semi-desert conditions in all the accessible areas of all the river valleys specially Sutlej and Bhagirathi. The only vegetation on these slopes is cactus.

Felling of green trees for commercial and industrial purposes is going on in hitherto inaccessible areas, because the State Governments in the Himalayan region have made income from forests as the main source of their revenue. Jammu & Kashmir has increased its forest revenue from 85 lakhs in 1947 to 40 crores in 1981-82. Himachal Pradesh does not lag behind. It has doubled its forest revenue within last five years.

Commercial exploitation of forests is not only for timber, but to feed the newly expanding forestbased industries. Resin and Turpentine is one of the major forest-based industries in all the three states. Excessive tapping of Chir-pine trees to extract more and more resin has not only lessened the strength of the timber, but has also been responsible for the premature death of lakhs of pine trees during the last six years. The number of broken and blown off trees has surpassed all previous records in H. P. and U. P. Hills. We had submitted a detailed note, "Bleeding Pines" to the Department of Environment on this tragic event, but no action has been taken. On the contrary, preparation, for tapping resin next year from already wounded trees are ahead, though one of the topmost officers admitted that destruction of trees in this manner will continue till the next ten years.

Natural disasters like avlanches and excessive snowfall area in 1979 were also responsible for the destruction of fir, kail and deodar forests in Jammu and Kashmir. This number is so great that those could not be counted so far. Young crop was badly affected and since the disappearance of natural forests after scientific management, there are trees of single age group which are the victims of those calamities. This puts a big question mark on the prevalent uniform system and mono-culture of pines.

Construction of motor roads from valleys to hill tops has destroyed a number of thick forests. This process has created long barren stretches, sometimes from the top of the hill right upto the valley. There is no hope of regeneration of vegetation on these slopes. We could see such spots between Symthen pass and Chingaon in Jammu and Kashmir, and in Gulaba Camp between Manali and Rohtang pass.

One of the most distressing sights was of the destruction of oak forests to plant Canifers, specially in Uttarkashi district of U. P. In H. P., we were shocked to see mass scale plantation of soil-depleter and water succour chir-pines. In terai area of U. P., most of the mixed forests have already been cleared and eucalyptus plantaions have been raised.

Destruction of forests and pollution of rivers in the hills have adversely affected the wild life and the fishes. Musk deer has practically disappeared. We could not see any wild animal except black monkeys and a few munals (hill pheasants), during our long march. Villagers, however, talk of bears, wild pigs and percupines, which damage their crops. Disappearance of many flowering tree species like panyan (Padam), Tun and use of pesticides in the orchards and farms has killed bees and 40% decrease in bee-swarms has been noticed by apiarists in Bhewali area of Nainital during the last 20 years.

Destruction of natural forests in the hills has radically changed the life style of the people. The self-sufficient people have become totally dependent on outside earnings. A large number of landless highlanders are migrating to the foot hills in search of land. The forest department complained to us that 1640 families have forcibly settled on 1920 hectares of forest land in Bindukhata near Lalkuan in Nainital terai. We visited the spot and found that the influx of landless from the hills continues. Even in terai, a cold war between those who want land for their survival and those who want it to grow raw material for industries like eucalyptus for paper and ravon industry, has begun. The latter being more powerful are employing their vast resources to crush the former. In hills after the conversion of mixed forests into chir pine forests, this process is over. The hill people have been uprooted from the soil There is scarcity of fodder, fuel and water. Life has become miserable.

WINDOW TO THE WORLD

Science for Villages is not an isolated effort. It is a part of a world-wide movement of A. T. Here is an account of the ideas and activities of the birds of same feathers from overseas.

A Novel Way to Cultivate Bananas: The University of Panama's Agricultural Research Station is testing the cultivation of Banana trees in association with legumes planted in plots beneath the trees. The project is intended to help to solve two of the banana grower's biggest problems, viz. nitrogen deficiency and water. In order to achieve good production levels, the farmer must apply about 400 kg. of nitrogen to every hectare of bananas every year. The cost of chemical materials has increased many folds in recent years and the prices are still rising. Bananas need lots of water, that is why they grow best in the humid tropics. But, heavy tropical rains continually wash away the top soil and probably, at least a quarter of precious nitrogen goes along with it. The result is a gradual depletion of the soil, and a huge waste of nitrogen fertilizer. Scientists have shown that a healthy ground cover of tropical legumes can 'fix' as much as 250 kg. of nitrogen per hectare per year. If the results are favourable, it is estimated that the legumes could save farmers millions of dollars in fertilizer cost and, more important, it should help many of the smaller producers to stay in business.

Coconut Wastes to Generate Power: Coconuts may soon become a substantial source of energy in many Asian and other countries. Filipino scientists are currently investigating the possibility of burning presently unused coconut waste – husks, shells and leaves to generate power. Plans are currently underway to set up three coconut processing and power generating plants in the Phillipines. A factory which processes 2,200 coconuts an hour into oil and other products has enough coconut wastes to run a 1500 kilo watt power station.

Flower Power: The production of an environmentally safe but highly effective pesticide will bring much-needed employment and foreign exchange earnings to Rwanda, one of Africa's least developed and most densely populated countries. The recent opening of a 3.5 million U. S. dollars refinery to extract pyrethrum from flowers in the country's northern highlands is expected to provide jobs for more than 20,000 people. Pyrethrum is the source of a family of pesticides that are far more effective than DDT, but which have a low toxicity for humans, other mammals, or plants, and which degrade safely and rapidly once exposed to sunlight and air. Pyrethrum flowers must be harvested at full bloom to obtain the highest concentration of the insecticidal extract. The operation is therefore labour-intensive and well suited to Rwanda's employment needs. More than 8,000 families are now engaged in production. In due time, subsidiary product industries to produce sprays, mosquito coils etc. are expected to evolve providing additional income and jobs.

Housing Innovation: A unique house design that combines strength, flexibility, low cost and simplicity has been developed by two Canadian architecture professors. Called RHOMBI by its designers, Professors James Strutt and Gulzar Haider of Carleton University's School of Architecture, Ottawa, Canada, the building is a departure from square, cubic constructions. It uses fewer members and supports than the traditional designs, and employs a very simple type of joint. A single steel column supports an angular fibre cement configuration topped by a flyroof (a secondary roof that deflects the sun's heat and provides ventilation). Vented ceilings and a louvre system control air movement through the house, making it suitable for tropical conditions. RHOMBI is easily and quickly assembled, and is rot, moidew and rodent-proof. The design allows for a high housing density – 44 to 72 dwellings per hectares – while maintaining privacy.

NEWS & VIEWS

WHY THIS NEEDLESS WASTE ? - The garbage from the four major cities of India-Calcutta, Bombay, Delhi and Madras alone could produce more electricity than the existing nuclear power plants in the country. Mechanized waste disposal plants not only recover valuable metals and other substances for re-use, but also produce fuel for power plants. But, in India, we are just pit dumping or burning it when only 60% of it could double the available energy in the country, and simultaneously, make Indian cities cleaner and healthier places to live in. One percent of India's labour force is engaged in collecting, transporting and disposing of the waste at a cost of Rs. 800 crores a year. Around 22,000 millon quintals of urban waste is generated annually by the 100 cities. In real worth, while 40% of it (things like metal and glass) can be recycled, 60% can be converted into energy. A 'waste' or "litter" tax on city dwellers and their education to ensure that dust bins and not the roadside should be used for waste disposal should be all that is necessary to keep the plants running profitably.

- Dr. A. S. Negi in a DEPTH NEWS, India Publication

20,000 SOLAR PUMPS BY 1985 – Nearly 20,000 pumpsets running on solar energy, each costing Rs. 50,000 are expected to be installed in the country by 1985. The pumpset is in an advanced state of designing, and commercial production is expected to begin by 1982.

Dr. T. G. K. Charlu, Chairman, Rural Electrification Corporation (REC)

LESS FOOD FOR MORE: During the next few decades, there will be an "unprecedented growth" in the world demand for food resulting from income growth in Third World countries, increased per capita consumption in the centrally planned economies, and little or no decline in demand in the developed countries. Such growth of demand among the comparatively well-off will reduce the availability of food to the countries with the most laggard development and to the poor in all countries. Increasing demand for livestock commodities in the Third World and the move to build livestock herds in the Soviet Union are important factors in the future grain picture. A large increase in grain imports in the People's Republic of China will add to the sqeeze on food supplies. The demand for food imports will be strongest in the major oil-exporting Third World countries. Although food intake will gradually improve in many Third World countries, the rising real price of food will continually squeeze the poor, and increased fluctuations of food supplies and prices will exert extreme pressure on them in some years

- John W. Mellor, Director, International Food Policy Research Institute (IFPRI) Washington.

STATUS OF CHILDREN: Of the 122 million children born during the International Year of the Child (1979), 10 percent are now dead, the victims of 'absolute poverty'. A further 20 percent will die before their fifth birthday. Only half will learn to read and write. Less than 10 percent will be immunized against common diseases or will have access to health care. But things could go much better. By the year 2000, all countries could achieve an infant mortality rate of less than five percent, an average life expectancy of 60 years, and a literacy rate of 75 percent. The evidence that these targets can be reached exists in the example of countries such as the People's Republic of China, Sri Lanka, and the Indian state of Kerala, that have achieved dramatic progress without a significant increase in GNP or per capita income.

- The State of World's Children', UNICEF REPORT, 1980.

INCOME DISPARITY: Reserve Bank of India figures reveal that in rural areas, the bottom 20 percent of the population has only nine percent of the aggregate income, while the top five percent has 17 percent of the income. In urban areas, the position is almost the same, except that the few rich are now richer and the many poor are poorer. The National Council of Applied Economics Research (NCAER) New Delhi has found in a study on the basis of 1975-76 data that the top one percent of the households in the country hold 14 percent of the national wealth. A study of the ownership of agricultural land reveals that three percent of the households possess 50 percent of the land, while 75 percent possess only 10 percent.

FREEDOM FOR HUNGER : ACTION NEEDED – Even more than three decades after the adoption of United Nations Charter, the implementation status of 'freedom from hunger' presents a dismal picture. In 1978 alone, more than twelve million children had died of hunger. The position could not have improved in 1979 which the U. N. declared as the International year of the Child. Almost 40 percent people in developing countries barely survive under desparate conditions of indignity and human degradation. Hence a massive programme for attaining self-sufficiency in food to combat the problem of hunger should be undertaken. A programme of action for appropriate agrarian reform and rural development to make food available to the poor and to ensure more equitable income distribution is the need of the hour.

– Mr. Justice Y. V. Chandrachud in a seminar on 'New International Economic Order' held at Bangalore on Jan. 20.)

ABOUT US

Centre of Science for Villages, Wardha is committed to taking benefits of Science from the threshold of labs to the doors of mud huts. A team of scientists, skilled artisans and village youth is striving to convert lab-techniques into rural trades in Housing and Environment, Energy and Fuel, Tools and Equipments and Non-traditional Crafts and Industries.

Project on S & T for Women: We had informed our readers earlier that C. S. V. has been assigned the responsibility of preparing a status report on 'S & T for Women'. After four months' labour on the part of the team of this project, the report has been finalised and sent to the Department of Science and Technology, Govt. of India. The report has been prepared on the basis of the information gathered through the visits to laboratories, replies to questionnaires sent to prominent scientists, social workers and voluntary institutions working in this field and the literature received at the documentation section of C. S. V. The report consists of (a) the technologies which have been found to have succeeded in being accepted in certain regions, (b) presently available technologies which have potentialities for helping women, and (c) techniques for which there is a felt need and areas where researches should be undertaken. The techniques useful in the following fields have been covered - employment, drudgery, sanitation and drinking water, nutrition and health, and hazards. The report is expected to be published by the DST soon.

EMINENT GUESTS AT CSV: Shri Satish Kumar, Editor of the bimonthly '*Resurgence*' from England, and a crusader for world peace and environment was with us for a few days in the last month. An old-time Gandhian, he visited all the constructive work institutions in Wardha. On January 14, he delivered a lecture in Magan Sangrahalaya in which he acquainted the audience with the life style in U. K. and the various factors affecting it. He dealt at length on the impact of industrialisation and the current trend of '*falling out*' of the system to '*go back to nature*'. He envisaged the '*fourth world*' in which people will be in harmony with nature and with the fellow human beings. Another distinguished visitor was Prof. Monger from Department of Pharmacology, London School of Medicine, England. A top man in his field, Dr. Monger is a staunch supporter of the movement for world peace and preservation of ecological balances.

EXPERIMENTS IN BIOGAS: Presently, the bio-gas section is carrying out experiments in the following fields:

1. Utilisation of thermal energy emitted in the process of composting for elevating the temperature of bio-gas plant digester, and thereby preventing the drop in gas production in winter.

2. Comparison of the gas-yielding capacities of different feed stocks like Koo-Babul, Gobar, Water Hyacinth and Ipomoea spp. The results are awaited.

LINTELS FROM L. P.: We have added yet another item to the long list of products which can be successfully prepared by using lime pozzolana in place of portland cement–the Lintel. Initial results are encouraging. The field trials on a 5′ × 14″ × 6″ lintel are in progress.

The BFPT section has undertaken production of greeting files cards, pocket files, holders, name plates and boards on a larger scale, after their utility and economic viability had been proved beyond doubt.

HOW YOU CAN HELP US?

* Send for publication your experiments and experience or information in rural technology you come across.
* Enroll subscribers (annual subscription for individuals Rs. 15/- and Institutions Rs. 25/- in India and for abroad, US Dollars 10 and 15 respectively) by sending addresses whom a free sample copy will be sent.
* Solicit appropriate advertisements to help financing this publication (Rs. 1000 for full page, Rs. 500 for half and Rs. 250 for quarter page per insertion).

Please write to: The Editor, Science for Villages, Magan Sangrahalaya, Wardha- 442001, (M.S.) ,INDIA.

Cover pages printed on Hand Made Paper made from Banana Fibre at C. S. V., Wardha : Printed and published by Shri Ravindra on behalf of Science for Villages, Wardha. Chief Editor ; Devendra Kumar, Editorial Office : Centre of Science for Villages, Magan Sangrahalaya, Wardha, Printed at Majestic Printing, Press, Nagpur.

Regd. No. WDA-119

VOL. V, No. 6

March 1982

THE CLOSE OF A CENTURY

The twentieth century which began with a bang of the industrial civilization when imperialism was at its zenith is coming to its close. Here we find a deep sense of insecurity in the spirit of man, about his civilization. The habitat of man the world-over has rapidly having a shift from the villages towards the cities and from smaller cities to megalapolises. This has lead to the crushing of the freedom of expression and diminishing of human contact with Nature and fellowmen. The amenities of soft life have no doubt multiplied, but at the cost of something which is very precious for the flowering of his spirit.

For fulfilling man's increasing wants, the fuels of the furnaces and the internal cumbustion engines of the industry, trade and transport were stoked from the non-renewable mineral resourees of the earth. Now the almost exhausted coal and petrol reserves are getting costlier and uneconomic with the passage of time. The search for the alternate renewable energy sources like the sun, wind, water, geothermal, tidal and animal is going on. These, however, are generally of a low entropy and will be viable only in a decentralised system of production and economy.

The pace of consumerism and the exploitation of the bicsphere by man has reached an alarming pitch. Thousands of species of life forms–fish, flora, fauna-have been obliterated during the century and the onslaught threatents many more. The pollution is destroying the waters, the soils and the atmospheres to a level that-self-cleaning and renewal cycles of Nature are getting clogged beyond repair.

Fourthly, the tempo of ever-increasing competition of the industrial market economy has lead to economic and political rivalries bursting into conflicts and conflagrations, whereby the towering giant war machines are taking away more and more percentage of the products of human efforts and converting them into not only waste, but progressively destructive instruments of death. The world sits on a volcano of self-annihilation threatened by an atomic holocast.

Those four phenomena–

(i) The sociological asphyxiation of human growth and culture through the alienation of man from mother Nature and brother Man.

(ii) The exhaustion by the generations of man of this centurys of fossil fuels, which were a trust property for all generation, to come,

(iii) Denudation and extermitation of the planet's proliferous life forms tearing assunder the symbiotic ecological fabric and messing up the biosphere, and

(iv) Heightening of tension and conflict among the people at all levels leading to an arms race of deadly magnitude.

The next quarter of the century must exert itself to the utmost to undo the maladies enumerated above and prepare the path whereby a change of direction is made possible as the third millionium after Christ dawns on a weary earth.

Devendra Kumar

Kindly send the questionnaire enclosed in this issue, after duly filling it up to us at your earliest.

from the labs

In this column, we invite techniques evolved in the labs of India as can benefit the villages and help in creating a new order.

Low Cost Bio-Gas Burners: Indian Agricultural Research Institute, New Delhi has designed efficient and cheap burners for bio-gas. The construction of these burners has been simplified by making the main body of the burner in two pieces of cast iron. The gas/air ratio for maximum thermal efficiency can be obtained by adjusting a perforated sleeve over the feeding pipe and a flame temperature as high as 720°C can be obtained. The consumption of gas for a 50 mm (2") burner is 2 to 4 cft. (50–100 litres) per hour at 2 to 6 cm of water column pressure. The average thermal efficiency of the burner ranges from 60 to 70 percent.

(Contact : Indian Agricultural Research Institute, Pusa, New Delhi).

Low Cost Overhead Projector: Appropriate Technology Development Centre, Coimbatore has developed an overhead projector which can project on a wall or a screen (size 1·5 metre × 1.5 metre) any transparency (Size: 50 mm × 50 mm). Anything drawn on a transparent plastic (polythene or acetate sheet) or a thin tracing paper by means of Indian ink, glass marking pencil or pastels can be projected. It makes use of a Philips comptalux bulb 230 V. 60 or 75 watts, placed in a sturdy, easy-to-dismantle steel base. The cost, including focussing arrangements is Rs. 300/–.

(For details, contact : Appropriate Technology Development Centre (ATDC), 15/2, Thadagam Road, Coimbatore – 641 025).

Improved Banana Figs : A New Village Industry: The ripened banana is a perishable commodity. The fetching price at the stage of blackening of skin is very poor due to flooding of market with this commodity and lack of alternatives for its disposal. Jamnalal Bajaj Central Research Institute, Wardha – has developed a simple method of preservable banana figs from ripened bananas. It consists of lengthwise slicing of bananas and treating them with clean lime solution for a fixed time interval and then drying them at 50° – 55°C. The product has good palatibility, and shows no deterioration during storage. The sweetness has a lingering quality and it increases with the period of storage. The economic feasibility study indicates that with an investment of about Rs. 2500, a workable industry can be started in villages. The product can be sold at Rs. 7.50/kg. whereas nutritionally equivalent products are being sold over and above Rs. 30/kg. in the market.

(Contact : The Director, Jamnalal Bajaj Central Research Institute, Maganwadi, Wardha, Maharashtra, 442 001).

Timber Tree Grown In Test Tube: Botanists at Delhi University have grown the entire plantlet of the *'Dalbergia sissoo'* in test tube by culturing a small part of the root of the germinated seed. Two to three plantlets of the tree have been produced within 30 to 45 days from a single culture. Attempts are being made to transfer these plantlets to the soil where they will grow into full trees. The *D. Sissoo* trees are normally propagated vegetatively by root suckers, but this takes a long time. Mass production of plantlets from seedling roots can be developed as a method of clonal propagation of the important timber tree. Plants produced this way look identical like products from a factory assembly line. Cabbage, sugarcane and many horticultural plants have been produced in the past, starting from pollen grains or few cells of a selected part of the whole plant. The work by the Delhi University team is the first report on clonal propagation of a timber tree using the seedling root as the starting material.

(Contact : Dr. Arundhati Mukhopadhyay and Dr. H. Y. Mohan Ram, Deptt. of Botany, University of Delhi, New Delhi).

Biomass Powered Pump: A biomass powered pump which could prove a boon to small farmers has been developed by the *Central Power Research Institute (CPRI), Bangalore, India.* The pump which works on steam condensation and expansion principle, uses firewood and other easily available biomass and is capable of lifting 1200 litres of water per hour. The device could replace conventional pump sets which consume over 9000 million units of power annually in India.

Casurina Energy Plantations: Shri AMM Murugappa Chettiar Research Centre at Madras has carried out studies on casuarina plantations at various places in Tamil Nadu and its neighbourhood. Tamil Nadu State Forest Department is also reported to be carrying out some research programmes in the areas listed below:

* To study the suitability of casuarina in alkaline area, at Vandalur Research Centre. * Studies to identify difference in yield between the male and female trees and air layering of *Casuarina jungheeniana*, at Markanam Research Centre. * Comparative studies in the yields of *Casuarina equisetifolia* and *Casuarina jungheeniana*, at Sholapuram Research Centre. * Studies to determine whether sand dunes can be stabilised by planting Casuarina equisetifolia at Rameswaram Research Centre. * At Krishi Vigyan Kendra, Pondichery, species selection studies are being carried out.

DESERTIFICATION :
An Ugly Word With An Ugly Meaning

The worldwide scourge of desertification or man-made deserts now afflicts, at varying levels of severity, some 680 million people in 63 countries. The effects in terms of human and animal suffering are appalling and in terms of feeding tomorrow's world-frightening.

The problem is ... ... Desert making. All over the world, people are busy making life even more difficult than it is. They are turning semi deserts into deserts and deserts into extreme deserts, transforming the barely productive into the unproductively bare. Soil and vegetation are taking so heavy a beating from human implements that 37.6 million km- a quarter of the earth's land surface- is in danger of desertification. The precious soil is either stripped from the land to fertilize the ocean or fill up reservoirs or it is sterilized by salt and alkali. Over much of the planet where two ears of corn or two blades of grass grew yesterday only one can grow today.

How serious is it ? Regions already in the grip of desertification of high to very high risk cover 19.9 million km² an area twice the size of Canada. The United Nations Conference on Desertification (UNCOD) classifies desertification risk as very high, high or moderate. The degree of risk is assessed on the basis of vulnerability of the land (a function of climate, terrain, soil and vegetation) combined with prevailing human or animal pressure. The grand total of moderate, high and very high risk areas plus the 8 million km² that is naturally extreme desert comes to 30% of the earth's land surface !

How fast is it happening ? Some experts say that desertification is taking place at the rate of 60,000 km²- or two Belgium's a year. In Sudan, the Sahara's southern limit has marched 100 km southwards in the last 17 years. Globally, agricultural and pastoral land is being degraded at the rate of 2,950,000 hectares a year.

How does it happen ? In patches : as if the Earth's flesh is being plucked from its body by a giant flail. Few of the very high risk areas are contigous with extreme desert, more are in the semi-arid than in the arid zone. This apparent paradox is symptomatic : pressure is greatest where conditions are marginally better. As the plant cover is destroyed, so erosion increases, leaving eventually only the dry bones of the land ; hard, sterile and unproductive. These bare patches link and spread, giving the impression that the deserts are advancing, when, in fact, all too often they are taking us by surprise from behind.

Desertification and nomads. Nomads, by definition are mobile. Moving with the seasons and the rains, they have always survived and even thrived in a state of balance with their harsh and arid environment. Now the balance is breaking down, partly because the nomadic pattern is itself breaking down. Changing attitudes, drought, government programmes, have all played their part in settling nomads. And where they are settled (chiefly around waterholes and new wells), the surrounding area trampled and overgrazed, soon turns to sand. Moreover pastures are being steadily lost to cultivation while live-stock numbers are soaring. More animals on less pasture, coupled with more sedentary ways, is a sure recipe for range destruction.

..... and rainfed farming. One primary cause of desertification is incursion of farming into more arid regions during a rainy cycle. When the drier years return, the crops fail, and the land denuded of its cover suffers severely. But the main trouble is caused by a whole-scale clearing and ploughing of the land that is highly destructive of the ecosystem. The new ecosystem that replaces it is much simplified and possesses few of the complex, natural checks and balances. For farming purposes, forests have the wrong soil and steep hills are the wrong terrain. On top of this, the "new" agriculture is often ecologically unsound. Where shifting agriculture or fixed farming gives way to intensive cropping with inappropriate machinery, fertility declines and the soil is then worked harder.

Even without the 'aid' of drought, the process is finally lethal. Drought, however, often intervenes to aggravate the symptoms - and also to mask the real cause. For when the rains return, all is assumed to be well again. But all is not well. The scarred land needs time to recover. It seldom gets it. The end result of the vicious circle is massive erosion and plumetting yields.

..... and fuel needs. As a desert maker, the destruction of trees and woody plants for fuel has few equals. The scale is prodigious. In Sudan, 548 million acacia shrubs are used just for cooking. And not just cut down, but pulled up so that regeneration is impossible. In the Tunisian case-study covering 20,000 hectares, 750 tonnes of wood are burt annually for domestic purposes. And so it goes on. *Where trees don't grow, the desert does.* The destruction mounts with the growth in human numbers. Since wood will continue to be the main fuel for the forseable future, only massive and skilful replantation can both supply the needed firewood and reverse the disastrous trend of ever-shrinking forests and ever-expanding deserts.

Vast amounts of firewood could be saved by better designed stoves and cooking pots. Alternative energy-wind and sun-can also help. Pilot projects in many desert lands are already underway.

ADAPTED FROM THE IUCN BULLETIN

BOOK WATCHING

The NFE Exchange : A timely information exchange service on non-formal education, published by the Non-formal Education Information Centre, College of Education, Michigan State University, 237 Erickson Hall, East Lansing, Michigan, 48824, USA.

Plain Talk: A series of short articles published by National Institute of Mental Health, Division of Scientific and Public Information, U S. Deptt. of Health & Human Services, Public Health Service, Alcohol, Drug Abuse and Mental Health Admn., 5600 Fishers Lane, Rockville, Maryland, 20857, U.S.A.

VITA News: A quarterly publication by ol Vunteers in Technical Assistance (VITA), 3706 Rhode Island Avenue, Mt. Rainier, Maryland, 20712, USA; donation 15 U.S. dollars per year. (Content: Information aimed at helping people and groups to select and implement technologies appropriate to their situation.)

Energy Digest: A monthly digest published by Mr. N. K. Gopalakrishnan for Tata Energy Research Institute, 24 Homi Mody Street, Bombay-400 023- (Purpose: Information Service for professionals concerned with energy management and development to provide orderly and compact perspective on a wide range of energy technologies-conventional & new and associated subjects.)

Journal of Bio-Waste Treatment: A quarterly journal published by Jyotsna Arogya Prabodhan, Dehu Village, Dist. Pune, Maharashtra, 412 109, India, annual subscription for individuals and institutions- Rs. 30/- and Rs. 40/- respectively in India and dollars 10, pounds 4 and dollars 15, pounds 6 respectively for foreign countries. (Devoted to health promotional, structural, technological, biological, agricultural, cultural, educational and other relevant aspects of biological wastes and utilisation of their end products, with emphasis on rural environment in developing countries.)

Energy Conservation Bulletin: A monthly published by Mr. N. K. Gopalakrishnan for Tata Energy Research Institute, 24 Homi Mody Street, Bombay 400 023. (Information on investigations, field projects, achievements and happenings in the field of energy conservation.)

IDRC Feature: A monthly feature service about science, technology and development, published by International Development Research Centre, Communication Service Division, Box 8500, Ottawa, Canada, K1G3H9.

Future: A quarterly publication published by UNICEF Regional Office for South Central Asia, address in India: Future, UNICEF House, 73 Lodi Estate, New Delhi, 110 003, India, annual subscription Rs. 30 in India and 6 U.S. dollars for overseas. (Devoted to Promotion of policies and services for the survival, development and care of children, primarily in the developing world. It aims to extend knowledge about the conditions of children and means to improve them and to improve communication and exchange between the related political, economic and socio-cultural fields of interest.)

Development Digest: A quarterly journal of excerpts, summaries and reprints of current materials on economic and social development, prepared by the National Planning Association, USA. In Africa, Asia and Latin America, the DIGEST is distributed through the U. S. Agency for International Development (AID) or through U.S. Embassy (if there is no AID office) to persons with a professional concern with the development process.

The Energy Consumer: Available free of cost from Department of Energy Office of Consumer Affairs, 8G082, Washington DC 20585, USA. (It deals with the information on the federal energy programmes and how others can be involved in them.)

World Watch Papers: A series of publications published by Worldwatch Institute, 1776 Massachusetts Avenue, N. W., Washington DC, 20036 USA. All Worldwatch papers and books published during the calendar year can be obtained by paying annual subscription of 25 U. S. dollars. Single copies available at 2 U.S. dollars. (Publication intended for a worldwide audience of decision makers, scholars and general public. Topics covered include energy, armaments, nutrition, ecology, health, women, choice of technology, economics etc.)

ENFO: A quarterly newsletter of Environmental Sanitation Information Centre, Asian Instt. of Technology, P. O. Box 2754 Bangkok, Thailand.

(See Page No. 10)

WATER HYACINTH : THE OTHER SIDE OF THE COIN

– Dr. Khan

Water hyacinth, the eye-catching menacing weed does have a role in assisting the mankind. The international study initiated by Commonwealth Science Council has enlisted its numerous uses-right from preparing paper & board, for generating methane to the removal of trace elements from polluted water-ways. Dr. Khan, a member of this study team, gives an account of its findings.

Water hyacinth in streams, canals, ponds, lakes and rivers, is nothing more than an expensive menance-rated as the world's worst aquatic weed. But grown under carefully managed controlled conditions, it can produce a whole string of valuable products in massive quantities Indeed, so good is the plant at providing oxygen, water and food, and so efficient is it at purifying wastes, that *NASA* is seriously considering finding room for it on its starships. It removes trace elements and other pollutants from industrial waste. Its stalk makes an excellent raw material for the production of papers and boards. And from its roots and rhizomes can be obtained an appreciable amount of sterols, especially stigmasterol which is needed for partial synthesis of steroidal drugs.

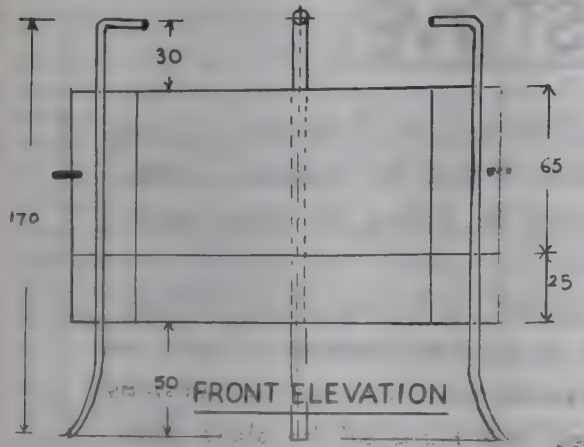
The plant has three parts: 25% root, 42% stalk and 33% leaf. One hectar pond of water hyacinth can produce 0.9 to 1.8 tonnes of dried mass of weed per day. *Regional Research Laboratory, Jorhat*, has used it as a medium on which to grow summer varieties of mushrooms *(Volvariella species)* which are traditionally grown on paddy straw. Water hyacinth has a remarkable ability to absorb metals such as lead, cadmium, mercury, nickel, chromium, zinc, copper and iron. It can also remove organic chemicals such as phenols, sulphides and chromium in addition to biodegradable matter like proteins, flesh and hair. A study is now in progress at the *Central Leather Research Institute at Madras*, into treating effluent of this type using water hyacinth. *Hyderabad's Regional Research Laboratory* is using water hyacinth stalks to produce paper and board. It is a renewable resource-one that regenerates itself far more quickly than timber. It is an ideal material for making grease-proof paper. The crude protein content of water hyacinth is high (20–30% dry weight in leaves). The amino acid distribution of leaves compares favourably with that of soyabean and cottonseed meal and may be used directly as an animal feel supplement.

In Bangladesh, leaf protein concentrate (LPC) has been extracted from one variety of water hyacinth under acidic conditions. Protein concentrate can be prepared from either the leaves or the whole plant by means of a simple 1% salt extraction which separates the soluble protein from the pulp. The filtrate is coagulated at 80 degree C, centrifuged and freeze-dried Biogas is produced from the anaerobic (in the absence of oxygen) fermentation of the substrate. The biogas produced contains about 60% methane. One hectare of water hyacinth, weighing 154 tonnes, when grown in a fertile sewage lagoon, could produce sufficient biomass to generate approximately 58,400 cu. m. of biogas containing 35,100 cu. m. of methane.

NASA studies have shown that with properly sized systems, up to 40% of daily waste water can be recovered as pure, fresh water by collecting the moisture that is literally pumped into the atmosphere via the plant's leaves. To collect this pure water, greenhouse covers with special collection pipes would be needed over the water hyacinth-covered area. This concept of fresh water recovery has great potential for arid regions of the world as well as the rural areas. In India, investigations have been carried out to make water hyacinth-cement sheets, similar to asbestos-cement sheets, both plain and corrugated. After the leaves and stalks of water hyacinth have been used for animal feed, biogas, papers, boards and mushrooms, growers could be left with considerable amounts of roots and rhizomes. They contain an appreciable amount of sterols, especially stigmasterol. These harbour *Mycorrhiza endotrophic* which plays an important role in phosphate uptake by plants through mobilisation of insoluble phosphates. The roots of water hyacinth can find a use as Mycorrhizal seeds for horticultural crops, especially in laterite soils where phosphates are known to be immobilised. **In the water hyacinth plant, there is hardly any part that needs to be wasted**: The plant seekst he status of a crop resource to ensure its proper management.

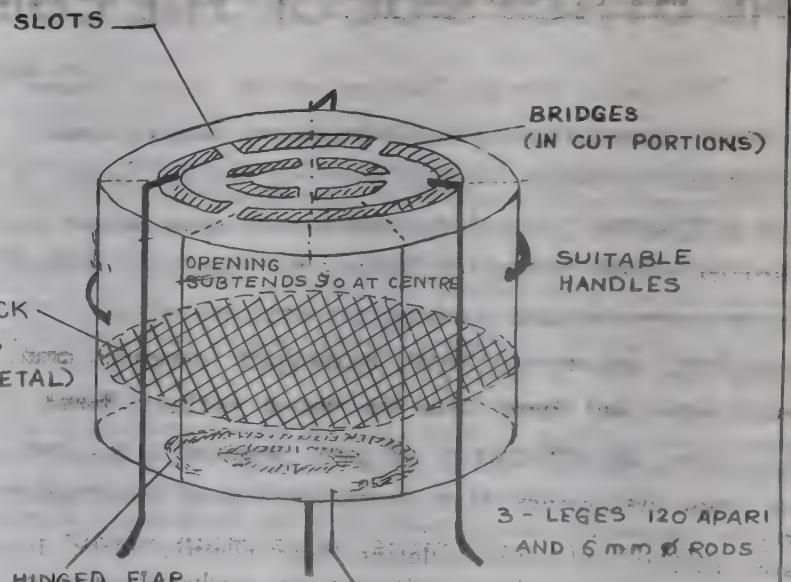
(Adapted from International Agricultural Development, Jan. 1982).

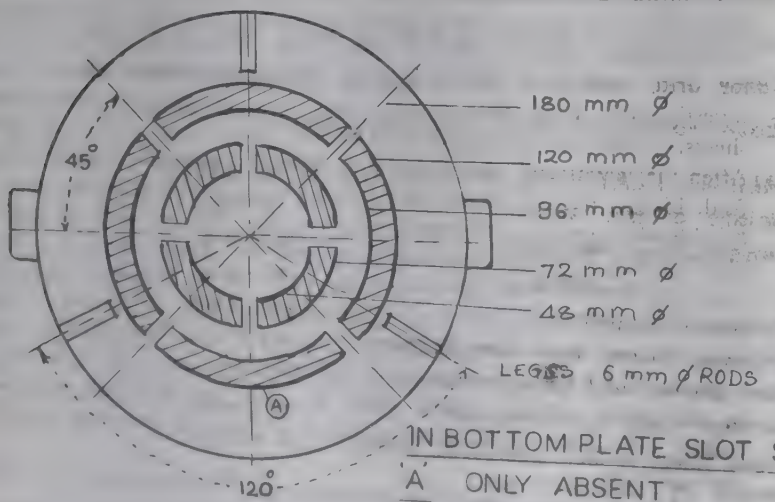
Due to unforeseen reasons, we could not publish the fourth article in the series–'Research in Biogas Technology and Utilization'. We regret the inconvenience caused to our readers. The article will be published in April 1982 issue of S. F. V. Bulletin.



FRONT ELEVATION

3-DIMENSIONAL VIEW





PLAN

NOTE:- FORWARD SEGMENT ABSENT
(IN BOTTOM PLATE ONLY)

IN BOTTOM PLATE SLOT SEGMENT
A ONLY ABSENT

CUT OUT SLOTS

WOOD BURNING STOVE-MODEL CS

AN EFFICIENT WOODEBURNING STOVE.

The Rural Energy Division of the Central Power Research Institute (CPRI) Bangalore, India, has developed a simple wood-burning stove which is more efficient than the traditional mud stove used in rural areas of India. The traditional stove wastes considérable energy on account of an undirected, wavering flame. inddequate aeration and exeessive fuel feed. Due to these factors these stove have an efficiency of just around 10%. The CPRI has designed two wood-burning stove which, under laboratory conditions, have much higher efficiency figures. One of the two models, namely Model CS, is described in this note.

The stove consists of a cylindrical combustion chamber closed at the top and bottom with slotted plates of a certain pattern. Inside the chamber is fitted a mesh slightly above the bottom slotted plate to serve as a fuel burning deck. The dimensions of the slotted plate and the chamber have been appropriately chosen so as to achieve improved combustion through mixing of combustion products and the regulation of the aerodynamic flow of air through the bottom slotted plate. The result is a sustained and complete burning of the fuel which results in a relatively non-luminous, non-sooty flame and well-directed heat. The chamber is fitted with sapporting stands for placing the vessel which is to be heated.

The stove is lighted by burning a piece of cloth soaked in kerosene or any other combustible liquid. A few sticks of wood are placed as in a normal mud stove. By the time the soaked cloth burns out, the sticks catch fire. A slight adjustment of the relative spacing and positioning of sticks yields a fairly light coloured flame. Once set the flame burns uninterrupted. The stove rarely, if ever, requires blowing in of air.

SALIENT FEATURES OF THE CS TYPE STOVE

Weight of the stove	0.9 kg.
Dimensions (Vertical)	190 mm.
(Lateral)	180 mm.
Space occupied	6805 cm^3
Average stove wall temperature	135 °C
Max. Stove wall temperature	257 °C
Average fuel consumption	8 g/min.
Time taken to boil one litre water	8-9 Min.
Weight of ash formed	40 g.
Unburnt corbon in ash	5%
Charcoal residue	negligible
Avarge power input	2.23 kW.
Avarage power output	600 W
Avarage operating efficiency	30%

Several prototypes of this stove have been distributed to members of the staff at CPRI. Evaluation by them reveals that this stove performs satisfactorily over a wide range of conditions.

CONTACT: "TECHNICAL DIGEST"
Vol. 2. No. 6. NOV.-DEC. 1981

There Are More People In Military Uniform Than Teachers –

An international group of specialists commissioned by the United Nations to investigate the relationship between the arms race and social development has reported that close to 6 per cent of the world's disposable resources had been consumed by the arms race every year for the past 30 years They noted that although there were just five recognized nuclear weapons powers, the race for conventional weapons had become a "global preoccupation" which diverted scarce economic, scientific, material and human resources away from society at large.

About 50 million (some say 100 million) people are employed directly or indirectly in the provision of military goods and services, including almost 20 percent of the world's engineers and scientists; more than 500,000 qualified professionals are engaged in military research and development pragrammes which spend close to 35 billion U. S. dollars a year in search of new weapons technology; and close to 6 per cent of the world's annual petroleum production is burned for military purposes, and more aluminium, copper, nickel and platinum goes into weapons systems each year than is consumed for all other purposes by the countries of Africa, Asia and Latin America combined.

World military expenditure in 1980 amounted to about 110 U. S. dollars for every man, woman and child on earth, and at the current rates of expansion, that figure would probably double before the turn of the century; more money is being spent on tanks, warplanes, missiles and artillery than on public health or education in the developing countries; and there are more people in military uniform world wide than there are teachers. World Health Organization had, in fact, spent less in 10 years to eradicate small pox (100 million U. S. dolars), than one arms supplier spent updating a small air-to-air missile. The average military product is about 20 times more research-intensive than the average civil product and "it is likely that the present stock of useful knowledge is much less than it might have been had we not pursued the arms race so enthusiastically."

(U. N. Weekly Newsletter, Feb. 5, 1982)

WINDOW TO THE WORLD

Science for Villages is not an isolated effort. It is a part of a world-wide movement of A. T. Here is an account of the ideas and activities of the birds of same feathers from overseas.

An 'Ecology' Movement : FRIENDS OF THE EARTH (U. K.) celebrated its 10th anniversary last year. The association's main activity is the conservation, restoration and rational use of the ecosphere. It first highlighted the waste of resources implicit in a throw-away society by means of a campaign around non-returnable bottles. Since then, it has participated in campaigns to protect the environment, in animal conservation campaigns and in nuclear power controversies. It has done its share and much more in making all the people conscious of the growing issues of environment in the twentieth century. It has also issued pamphlets and well researched books.

Goodbye, Birds And Bees: According to W. A. Keller, of Agriculture Canada's Ottawa Research Station, Candian researchers have made a significant contribution to production of virus-free crop plants in cassava and various legume species by plant tissue culture systems. Once a disease-free plant has been regenerated, it can be used to produce as many as one million uniform plants in a year. Such techniques would be of special value in tropical agriculture to improve production of root crops such as potato, sweet potato and yam. Plants generated in the laboratory with superior resistance to factors like draught, soil salinity, or disease, could be crossed with local varieties to improve the species. Basic tissue culture technique is fairly unsophisticated, and can be used to produce entirely 'new' plants by wide crosses between plants of different species and synthesis of natuaral plant products. *Now it seems that plants of the future may owe a great deal more to the dissecting microscope and culture chamber than to the birds and bees.*

Low Temp, Low Cost Method Developed For Methane Production: Researchers have been investigating many forms of fossil energy-particularly coal from which synthetic fuels could be made. High temperatures above 600 degrees centigrade are needed to treat coal with steam in an expensive, two-step process. However, the new process being developed at Lawrence Berkeley Lab. California for converting graphite, a pure carbon to methane, a hydrocarbon gas with a high heat content, involves only one step and is carried out at relatively low temperature. Scientists have found that in the presence of water vapour, they could convert crystaline graphite to methane and carbon monoxide or carbon dioxide at low temperatures in the range nf 250 to 300 degrees centigrade. Alkali hydroxide-sodium, potassium, cesium and lithium hydroxides or carbonates of these same alkali metals were used as catalysts to initiate the chemical reaction. A catalyst was deposited on the graphite surface, which was heated under atmospheric pressure. The water vapour was the only source of hydrogen and oxygen needed to produce the hydrocarbon gas. Scaling up of this process using more economical sources of carbon, for example, coal and biomass, including wood plant sources is under consideration.

(Contact : Gabor Somorjai & Alejandro Cabrera, Lawrence Berkeley Laboratory, University of California, U. S. A.)

New Maize Species May Be 'The Find Of The Century' : A newly discovered relative of the maize plant is being hailed as 'the find of the century' because it may make possible the long-dreamed-of perennial grain which will result in a saving of money now spent on ploughing under old plants and sowing the new ones. The new plant is disease-resistant and tough and probably will impart these qualities to modern varieties. Discovered accidentally by Mexican botanist Rafael Guzman, the plant and its descendants can thrive in mild, or tropical climate and by indications, its genes may also provide greater stalk and root strength, multiple ears per plant and tolerance for poorly drained soil.

'Green' Charcoal from Biomass : Mr Gonzalo O Catan of the philippines, has developed a method to produce 'green' charcoal from biomass like grass, twigs, sea weeds, saw dust and other cellulosic material. This, when mixed with coal or charcoal and briquetted yields a fuel with a BTU value between 10,000 and 20,000. *Method* Cellulosic material is first gathered, sprayed with water and allowed to decay for 30-45 days The partially decayed material is cut and ground. The biomass can then be mixed with coal, if desired, and briquetted. Briquetting does not require the use of an external binder. Lignin available in the biomass is itself used as a binder. 'Green' charcoal is claimed to be easy to ignite and is said to burn with a low, clean flame.

Integrated Pulp Manufacturing from Bagasse: The Thailand Institute of Scientific and Technoiogical Research has just completed a feasibility study on the utilisation of bagasse and other locally available raw material, such as rice straw, keraf and hardwoods in the paper and pulp

(See Page No. 10)

Book Watching (From Page 4)

Growing Without Schooling: Published approximately every other month at 729, Boylston Street, Boston MN 02116, U.S.A. Subscription rate U S. dollars 15, 24, and 30 for 6, 12 and 18 issues respectively. (It deals with pooling of experiences of parents who are trying to educate their children without sending them to schools and other related materials).

Self Help Spot l ight: A bimonthly published by SHARE Community Limited, 177 Battersea High Street, London, SWll, 3 JS, UK, annual subscription - 6 pounds or 15 U S. dollars. (It covers news about groups, information, source of advice, books and happenings in the field of self-help).

Cross Currents: A quarterly review to explore the implications of Christianity for our times, published by Convergence, INC at 103, Van Houten Fields, West Nyack, NY 10994, USA, annual subscription U S. Dollars 8.50 for individuals and 10.50 for institutions and libraries outside U. S. A.

R & D Mexico: The international magazine of Scientific research and development in Mexico, for correspondence in India, contact: 652-313/344, Lic. Miriam Weissberg, N-88, Panchashila Park, New Delhi 110017, annual subscription Rs. 15/-.

International Agricultural Development: Published ten times a year, available on subscription only. Annual subscription-20 and 30 pounds for individuals and institutes respectively. Published by Pharos Publishing Services Ltd., Thorpe House, Croft Road, Craw-borough, East Sussex, TN6 1 DL, UK.

Food And Nutrition Bulletin: Published quarterly by United Nations University, Toho Seimei Bldg., 15-1 Shibuya 2 Chrome, Shibuya-Ku, Tokyo 150, Japan in collaboration with the United Nations ACC Sub Committee on Nutrition.

Co-Evolution: Published quarterly by POINT, Box 428, Sausalito, California 94966 (27 Gate 5 rood), U. S. A, annual subscription 14 U. S. dollars.

Environmental Sanitation Abstracts: Low cost options: Published by Environmental Sanitation Information Centre (ENSIC), Asian Instt. of Technology, P. O. Box 2754, Bangkok, Thailand, available to members of ENSIC through membership fees - 35 & 70 U. S. dollars for individuals and institutions in developing countries respectively. (Subjects covered include methods of collection, treatment, re-use and disposal of domestic waste water and human waste.)

Ecodevelopment News : Published by International Research Centre on Environment and Development (CIRED), 54 Boulevard Raspail, Room 311, 75270 PARIS CEDEX 06 (France).

ASSET: Abstracts of selected solar energy technology, published by The United Nations University, Toho Semei Building, 15-1 Shibuya 2-chrome, Shibuya-ku, Tokyo 150, Japan. (The purpose of this publication is to provide workers from developing countries with abstracts of recent books, articles, reports and conference papers concerning solar, wind and bio-conversion energy technology and the socio-economic impacts of their introduction).

Window to the world (From Page No. 9)

industry. The results of the study show that it would be economical to situate a plant producing about 20 t/day of white printing paper and 30 t/day of writing paper near a sugar refinery, using bagasse as raw material. *(Further details may be obtained from Mrs. Naiyana Niyoman, TISTR Research News, TISTR, 196 Phahonyothin Road, Bangkok 8, Thailand*

New Wind Power Generator: Swiss engineers have developed a 5 kW wind generator suitable for use in developing countries. The installation compries of a generator, a mechanical controlling system and a device to orient the installation in the most favourable direction. The generator is mounted on a tubular steel supporting pole. The generator has a nominal power output of 5 KVA. Its efficiency is about 90% in the range 3-5 KW. The wind generator can be used to charge 9 or 12 V batteries upto a total capacity of 114 Ah. These batteries can supply 100 volt DC or 200 volt AC at 50 Hz with a single phase inverter. The generator can also be used for pumping.

NEWS & VIEWS

Plight of Indian Women: Infant mortality rate for boys is 120 and for girls 131 per thousand, because social factors operate against women in India in all walks of life. Indian women are more under-nourished than Indian men. The nutritional requirements of women are, according to standard text books, lower than that of men because women are smaller and are assumed to spend less energy. Also, household duties and related work were not taken into account. But, according to a survey of a rural area computing the total work load of men, women and children, women do 53 percent of the work, men 31 percent and children 16 percent! Every second pregnant woman, according to the National Institute of Nutrition, is anemic. Of the 30 years of her reproductory life, nearly 16 are spent in pregnancy and lactation. The average Indian woman becomes pregnant eight times and bears six or seven children and every delivery of a live child is followed by two years of nursing. The maternal death rates in India rank among the highest anywhere in the world – 573 for every 100,000 live births. Health services catering to mothers and children are meagre and generally the treatment meted out to women is of a lower quality. – *S. J., Science Today, Feb. 1982.*

Time for Understanding and Action: Our challenge today is less a lack of answers than the failure to practise them. Most of our activities still go on as if the great debates of the past decade had not yet happened. It is vital to realize that the emperor really has lost his clothes, that the men of power are powerless, that the alternatives are often the only alternative, and not just some fringe activity. The traditional farmer forged his own axe and could not work with anyone else's. Tools and technologies are not neutral. We must not just change the software, the programming, but the hardware as well. Our whole world is being disordered and disrupted in the name of an economic efficiency creating short-term profits for a small minority at the expense of us all. We must decide whether we want to be a part of the problem or a part of the solution. We cannot leave it to the experts. Every one of us has his or her unique contribution to make. As Buckminster Fuller has said, the scales are now so evenly balanced between disaster and survival that every single individual can make a crucial difference. – *Jacob van Uexkull at the presentation of the Right Livelihood Foundation Awards 1981 at Stockholm on Dec. 9, 1981.*

Oceans – The World's Thrash Cans: According to experts, about 10–12 million tonnes of petroleum are dumped each year into the oceans. (This includes the unburnt residue of diesel oil from ship's funnels deposited on the surface of the sea.) One cubic metre of petroleum discharged into the sea would cover 20 sq. km. of water, so that 10 million tonnes of oil would cover 200 million sq. km. or two third of the world's ocean. No one knows how long these petroleum layers remain on the surface of the sea. But during their lifetime, they substantially modify exchanges between water and air. Oxygen from the atmosphere, which sea creatures need in order to breathe, dissolves more slowly in water, and the evaporation rate is reduced. Since the rate of evaporation governs the pattern of rainfall and cloud formation over the continents, petroleum pollution thus adversely affects the climate.

Solar Energy Is The Answer: Solar energy has a vast potential to meet energy needs of the world. What is needed is the tapping and building of the available resources. If all the incident solar energy is collected and stored for 20 days, it would be equivalent to the energy produced by total fossil reserves available in the world. The world's energy demand of 9,500 billion watts can be met by collecting solar energy on .05 billion hectares of land. Portions of vast deserts of the world would be ideal for collection of solar energy through biomass, artificial biomass, P. V. Cells and water heaters. This can be possible in an inter-dependent world. Such a situation is still long way off, but not beyond our grasp. – *Nobel Laureate Sir George Porter of Britain in his keynote address at a plenary session of the 9th Public Relations World Congress at Bombay on Jan. 21, 1982.*

Priority for Nitrogen Fixation: About one-third of all fossil energy used in current agriculture goes into the production of chemical nitrogen fertilizer. It is the single-most costly input and its cost will continue to increase as the supply of fossil fuels dwindles. One solution may be found by studying plants that "create" their own fertilizer by combining with soil bacteria called rhizobia by synbiotic nitrogen fixation. *Such research should be viewed in the same light as research on non-renewable energy sources and energy self sufficiency for less-developed countries.* Much could be done in a relatively short period to improve yields of both forage and grain legumes. Similar research in the field of forest biomass production is also receiving increasing attention. For the long term future, the greatest advances will be made in creating new strains of bacteria through genetic engineering and the application of recombinant DNA technology – *Dr. R. W. Miller, Head, Nitrogen Fixation Program of Agriculture Canada.*

ABOUT US

Sundarlal Bahuguna On Chipko :– Shri Sundarlal Bahuguna, the well-known spokesman of the CHIPKO movement for the preservation of the Himalayan eco-sphere, delivered a lecture on 'One tree equal to ten sons' at Magan Sangrahalaya on Feb. 19th, 1982. In his speech, the environmental activist gave a detailed account of the birth and development of the peoples' movent against erosion of the eco-system of Uttarkhand region of the Himalayas. He said that in the present phase of the agitation, attempts are being made to spread the message of the struggle to other parts of the nation to create a wider awareness on the issues of environment and for the support of CHIPKO. As a part of it, a padayatra from Kashmir to Kohima is in progress and is gaining momentum. He also opined that decisive activities at the policy-making level are necessary, as mass awareness and struggle at micro-level alone cannot solve the problems concerning enviroment. A slide show on the CHIPKO movement' accmpanied the lecture.

Participation In Exhibitions :– CSV participated in an exhibition on 'S & T For Women' organised by Appropriate Technology and Rural Development Centre of IIT, Delhi from Feb. 22nd to Feb. 24th, 1982. The exhibition was accompanied by a workshop on the same theme. About 200 delegates from eight states, including representatives of CSV participated in the seminar. All the exhibits of CSV were later on purchased by the Home Science Department of Lady Irvin College, New Delhi. CSV also exhibited some of its techniques in an exhibition organised by the Department of Agriculture, Wardha District Council at Village Jamb from 13th – 15th Feb.' 82.

Low Cost, High Quality Files :– The files prepared from banana fibre at the BFPT section of CSV have proved to be of a superior quality and less cost as compared to the files prepared in mills. It is rather rare to see that a product from decentralised sector is comparable in quality and price to the one from a centralised production unit. The following chart will be illustrative :

File	Price	Tear (Gm)	Tear factor	Burst (kg.) / cm. sq.	Tensile kg./cm.
A.	1·75	16·00	45·7	4·1	10·3
B.	1·75	14.5	44·7	2·5	10·00
C.	1·20	17·3	43·3	4·3	6·5
D.	1·00	15·5	46·7	2·7	6·00

Files A and B are from mills, whereas C & D are CSV products

– RAVINDRA

CSV FRIENDS IN ACTION

Lokvidnyan Workshop On Superstitions :– Lok Vidyan Sanghatana, Maharashtra, an organisation committed to the peoples' science movement has organised a 2-day workshop on 'Superstitions' on 27th and 28th February, 1982 at Pune. The workshop was intended for the interaction among the activists from different organisations on the various superstitions prevalent in the society, their analysis and the ways to fight them. The programme consisted of lectures, group discussions, demonstrations and organisation of cultural programmes on the theme of the workshop.

HOW YOU CAN HELP US –

* Send for publication your experiments and experiences or information in rural technology you come across.
* Enroll subscribers (annual subscription for individuals Rs. 15/- and Institutions Rs. 25/– in India and for abroad, US Dollars 10 and 15 respec ively) by sending addresses whom a free sample copy will be sent.
* Solicit appropriate advertisements to help financing this publication (Rs. 1000 for full page, Rs. 500 for half and Rs. 250 for quarter page per insertion).

Please write to : The Editor, Science for Villages, Magan Sangrahalaya, Wardha– 442001, (M.S.) INDIA.

Cover pages printed on Hand Made Paper made from Banana Fibre at C. S. V., Wardha : Printed and published by Shri Ravindra on behalf of Science for Villages, Wardha. Chief Editor : Devendra Kumar, Editorial Office : Centre of Science for Villages, Magan Sangrahalaya, Wardha, Printed at Majestic Printing, Press, Nagpur.

Regd. No. WDA-119

VOL. V, No. 8

May 1982

WHERE THERE ARE NO SERVANTS NOR MASTERS

A famous Hindi proverb says : "Uttam Kheti Madhyam Ban, Nikrishta Chakari Bheekha Nidhan" meaning that best is working on one's own land, the middle course is being self-employed, the worst is being somebody else's wage servant and of course, the last refuge remains being non-productive and depending on alms from the society.

Ivan Illich, in his recent book, "Shadow work" analyses the European History of wage labour and writes that till the 17th century, "the dependence on wage labour was the recognition that the worker did not have a home where he could contribute within the household." He says that between 17th and 19th century, "instead of being a proof of destitution, wages came to be perceived as a proof of usefulness; the natural source of livelihood for the population. An unprecedented economic division of the sexes, economic conception of family, antagonism between domestic and public spheres made wage work into a necessary adjunct to life.... The bourgeois war on subsistance (self employed productive activities-ed.) could enlist mass support only when the plebeian rabble, turned into a clean living working class made up of economically distinct men and women. As a member of this class, he found himself in a conspiracy with his employer – both equally concerned with economic expansion and suppression of subsistance. Yet, this fundamental collusion between capital and labour in war on subsistence was mystified by the ritual of class struggle."

Thus we find in India, as well as in Europe, the self-subsisting occupations were the rule which the industrial wage earning civilization usurped. It created the classes – the master and the servant – much more definitedly than ever before. The more sophisticated the machine of production, the more centralized their coordination and more large-sized and capital-intensive their economy, the greater is the need of a bigger master-servant gulf, and in the process the more helpless becomes the individual.

Could science and technology which has been the arbiter of and abettor in the above process, itself be made to bring about an economy where the liberty of the individual as a self employed economic unit, related to each other in balanced inter-dependence and having a symbiotic relationship with Nature's bounties could be preserved. Progressively, free people are being sucked into the wage earner economy. The economics of size is obliterating "the small but beautiful." Could Science restore this beauty? With the newer knowledge of physical and social sciences, this imperative need must be possible to be fulfilled.

Of all the countries, India still has the largest number of people forming 60% population who are nobody's servants nor anybody's masters. These need to be enhanced not only amongst the chosen few, but amongst all. We should, therefore, make an asset of our self-employed occupations by supporting, improving and enhancing them through scientific means.

The observance of 15th of April as the day for the self reliant, self employed people by the Self Employed Women's Association (SEWA), Ahmedabad is, therefore, to be greatly welcomed, and should be taken up on world-wide basis, as the dignity of man depends on it. The concept, however, will get clearer and the path leading to it brighter as we proceed towards it from various directions.

Devendra Kumar

from the labs

Simple Chlorinator for Disinfecting Open Wells : In the village of Kanchanpur matiyari near Lucknow, a simple chlorinator is developed by using a plastic bucket (about 21 cm. deep an d 17 cm. dia), corks, stone ballast, pebbles, 750 gm. of bleaching powder and 37.5 gm. of sodium hexametaphosphate. The chlorine mixes with the water by the principle of chemical diffusion, by removing the corks used to close the holes in the lid and the bottom of the bucket during the drawing and returning of the bucket from the well. The mixture of sand and chemicals is changed frequently. A piped water supply, if practical, would cost Rs. 1200/- per family initially. With the pot chlorinator, however, the costs are minimal, and even the recurring expenditure is only about Rs. 0.75 per family per month. The results are encouraging.

Energy Saving in the Firing of Building Bricks : The high drought kiln developed by CBRI, is an archless, topped, coal fired kiln which has proved to be highly efficient with coal consumption as low as 100 to 120 kg. 1000 bricks compared to 160 to 180 kg. in the bulls kiln. For every lakh of bricks fired, a saving of 2.17×10^4 MJ of energy ean be effected. The proportion of well burnt bricks in this kiln is also much higher than in the bulls kiln.

(Central Building Research Institute, Roorkee, 247672.)

Winged Bean : A Super Crop : The winged bean - *Psophocarpus tetragonolobus* provides six different food products and contains as much nutritional value as the soybean. It now grows in 70 different countries and thrives in hot, humid, equatorial regions. The young pods lack noticeable fibre and make a succulent greeen vegetable that can be eaten raw, steamed, boiled, fried or pickled to make a crisp chewy delicacy. They can be used in salads, soups, stews, and curries, and taste similar to green beans. The leaves-rich in vitamin A – can be cooked and eaten like spinach; the plant's succulent shoots resemble lacy, thin asparagus; and its flowers, when steamed or dried, make a sweet garnish. Winged bean seeds contain protein, oil, minerals, vitamins, essential amino acids, and other constituents. Once processed, they are highly digestible. When fried or baked, the seeds make a delicious nut-like snack. Roots, if cultivated correctly, form tubers the size of small carrots. These tubers are exceptionally rich in proteins, containing two to four times as much protein as potatoes and more than eight times as much as cassava. In order to produce large amounts of pods and seeds, each plant requires staking – a laborious and costlyt ask to carry out on a mass scale. For this reason, the immediate future potential of the winged bean is as a subsistance crop or as a cash crop for small markets. For home use, the plants can be trained to grow up a tree, along a fence, or against a house.

Improved Technology for Pottery : *Central Glass and Ceramic Research Institute (CGCRI), Calcutta* has developed a technology for making impervious pottery articles almost similar in quality ro ceramic utensils, at a much lower temperature. This technology can be used for making vitrified pipes/channels for drainage of household waste water, tiles for walls, roofs, floors and artistic articles with vitrifiable mixtures. The village potter may even make cottage industry scale electrical insulators for domestic power supply which would require a much lower temperature of firing. *The Regional Design Centre, Calcutta of the All India Handicrafts Board* supplies ready-made ceramic glazes to the village potters. At the instance of the Centre, suitable glazes substituting the imported tin oxide and minimizing the use of lead oxide were developed at CGCRI which reduced the cost of the glazes by about 75 per cent and increased their consumption by about 4 times. The red lead content was brought down from 20-50% to 10-12%. Several completely lead-free coloured matt glazes maturing between 750°C and 990°C were developed. The cost per kg. of glazes was reduced by more than 80% through elimination of tin oxide and red lead in the glaze.

Central Glass and Ceramic Research Institute, P. O., Jadavpur University, Calcutta, 700032.]

Now Lac-Based Glue Developed : A new glue paper, based on aqueous, alkaline solutions or shellac and hydrolysed lac has been developed at the *Indian Lac Research Instttute, Ranchi.* It is hardly for pasting paper on other surfaces such as paper, glass, metal/plastic containers wood and cloth. It has passed tests for adhesion and brittleness and can be stored without and deterioration for two years and compares well with other glues.

SUCCESS STORY

FRIENDS RURAL CENTRE, RASULIA

Most often, concrete action, rather than abstract philosophy stimulates human mind for action – that is what our readers feel, and so do we. Hence, as per their desire, we intend to publish success stories of development efforts from time to time. Here is the first one in the series. We request our readers to send us their experiences of working in villages– of success as well as of failure. For quite often, failures rather than success are more educative. — *Ed.*

Background : The Frineds Rural Centre, Rasulia was originally established by Friends Service Council, London, in 1888 through a few Quakers from the United Kingdom settled in Hoshangabad. During the next 20 years, many famine orphans were trained as carpenters or blacksmiths and in '30s, Hilda Cashmore, Chetsingh Ranjit and Donald Groom did pioneering work in adult and basic education. After Independence, the activities of workers from U. K., U. S. A., Canada and Australia led to a number of practically useful innovations in water-supply and irrigation, sanitation, housing etc. The Rasulia "ring-well" was a notable success. Some of the young people trained in the workshop during this period are making a useful contribution as reliable and skilful artisans.

The Broader Sense of Education : Rasulia Centre has maintained, in various ways, a concern for a better life for the very poorest, along with an outreach to the potential leaders of change, stimulating thought, identifying the real problems of the district and seeking ways of moving forward towards "sarvodaya". The workers have begun to feel (in Mark Twain's words) that they cannot "allow schooling to interfere with education." The way in which the regular daily work is organised and carried out is itself a tool of continuous daily education for all the members of the staff and for those who come in contact with them. The team members believe that the ideals of self respect, 'sarvodava' and community integration must find expression in their daily work and relationship – on the farm and in the workshop, clinic, office and milk-distribution. Hence, they try to overcome the divisions which arise from differences in pay or social background.

Experiences About Cross-bred Animals : The centre found that the policy of using cross-bred animals from exotic stock for milk production, makes it difficult for the poorer farmers to benefit from the programme. During 1981, it carried out investigations into the experience of local cattle owners, and of cattlebreeding and research institutions at Karnal, Suratgarh and elsewhere, but could not find a single poor or marginal farmer in the area who had been helped to self reliance by owing a crossbred cow. The fact is that cross-bred cows cannot be properly cared for by poor villagers because of their poor natural immunity from disease and their inability to withstand heat. The cost of maintenance is high, and artificial breeding presents many practical difficulties. However, exotic cross-breds have been successfully kept in area by some well-to-do owners, who could bear the expenses of maintenance and who also had political influence which ensured help needed from the Government veterinary department and milk marketing organisation. The Centre's own cross bred herd had far more trouble with mastitis than the pure-bred Indian Tharparkar herd. It also had another problem of enlarged udder. The udders of some of the best milkers have become so large that the cow has difficulty in walking and the teats begin to touch the ground. Milking is almost impossible; injuries and infections have occured. It seems as though cross-breeding can inadvertently lead to genetic imbalance. Good pure-bred Indian cows (Tharparkar, Gir, Sahiwal, Red Sindhi) have a milk yield only marginally less than cross-breds. They certainly need more care than the low-yielding local cows, but this care is within the ordinary man's capacity. They are well adapated to the climate, and their male calves make good bullocks. Both Rasulia and Karnal have found that cross-bred male calves are practically unsaleable, whereas Tharparkar calves of either sex fetch the same price. Experience and observation have convinced the Centre that pure-bred herd is far more relevant for its purpose than a cross-bred one, and it has decided to make a change gradually replacing cross-breds by Tharparker animals.

The propaganda for cross-bred cows has tended to reinforce the false and damaging stereotype that all foreign things are superior to their Indian counterparts. Examples of this same stereotype abound in agriculture also : tractors rather than bullocks, Mexican rather than local wheat, chemical fertilisers and pesticides from the international companies rather than farmyard manure. The Centre feels that the time has come to challange these stereotypes and experiment boldly with methods relvent to the poor. Workers at Rasulia are now able to do all agricultural work by human and bullock power, and plan to sell the tractor and the heavy machinery that goes with it. They wish to reduce even further the use of fossil energy and machinery in agriculture e. g. wheat sowing by broadcasting results in tremendous saving of time and energy and excellent germination. They

(Conted. on Page 10)

BOOK WATCHING

Energy Fact Sheets: One or several of them are published at a time by Energy Information Administration (EIA) of U.S. Deptt. of Energy to acquaint people at large with fundamentally important matters concerned with energy in a simple manner. Useful as teaching aids. Topics covered include - The B.T.U., solar collectors, energy in transportation etc. Sources of data mentioned for those interested in details. Free of cost. *(U. S Department of Energy, Energy Information Administration, National Energy Information Center, EI-20, Forrestal Building, Washington, D.C. 20585)*

Child-to-Child Programme Newsletter: Child-to-Child is an international programme designed to teach and encourage older children, specially school children to concern themselves with the health and general development of their younger brothers and sisters. It consists of teaching preventive and curative activities, games, plays and other means to the children to convey the message in an effective and entertaining manner to them who will further pass it to their family or community. The newsletter records some such projects - planned or in process. Can serve as the starting material to undertake such a project by interested persons. *(Institute of Child Health, 30 Guilford Street, London WC 1N 1EH.UK.)*

EIA Publications - New Releases reports monthly the newest available Energy Information Administration (EIA) publications, as well as upcoming services. Helps keep the reader abreast of the latest information in the field of energy. *(National Energy Information Center, 1000 Independence Avenue S.W., Washington D.C. 20585)*

Appropriate Technology Bulletin: Abstracted reviews on selected NTIS documents providing scientific and technical information which can be transferred, adapted and applied to solve developmental problems. *(Allied Publishers Pvt. Ltd., 15 J. N. Heredia Marg, Ballard Estate, Bombay-400038)*

Ceres FAO Review on Agriculture and Development: A bimonthly published in English, French and Spanish, annual subscription- 12 U.S. dollars. Provides information of FAO activities and articles on varied topics related with agriculture and development. *(Food and Agriculture Organisation of the U. N., Via delle Terme Caracalla, 00100 - Rome, Italy. or any of FAO agent - for India - Oxford Book and Stationery Co., Scindia House, New Delhi; 17 Park Street, Calcutta.)*

Health Technology Directions: A monthly publication of Program for Appropriate Technology in Health (PATH) which aims at identification, development and adaptation of useful health technologies and products. It also intends to link health providers in developing countries with manufacturers and developers of health products and related technology. Each issue of 'Directions' provides information in nutshell about all aspects regarding a selected topic of health *(Program for Appropriate Technology in Health (PATH), Canal Place, 130 Nickerson Street, Seattle, WA 98109, USA.)*

Land for People: Land Tenure and the Very Poor by Claive Whittemore. For the third world people, the problem of land tenure is the problem of power and of poverty. This report describes prevailing land tenure systems in Africa Asia and Latin America. It examines the policies and activities of international and governmental aid and investment institutions and questions their present role in removing rural poverty. Price 1.30 pounds *(Oxfam, 274 Banbury Road, Oxford 0x2 7DZ.)*

The Poor Man's Wisdom by Adrian Moyes : This booklet contains a shortened version of a paper prepared by Oxfam for the UNCSTAD to investigate what Britain could do to help poor people benefit from technology and also a series of real-life examples from all over the third world. It strongly argues that **thoughtless use of modern technology has considerably weakened the local technology which needs to be promoted as a tool of the people for their own development.** It also emphasizes the need to help people select and modify outside technology. It also highlights the often-neglected fact that **social and political arrangements are more important than the actual hardware.** Price - 70 p. *(Address as above).*

Major Dams-A Second Look (Development without Destruction) Edited by L. T. Sharma and Ravi Sharma. It is a collection of papers presented at a seminar to consider various aspects of river valley projects in North Karnataka. Many of them bring to the fore the importance of local community involvement and participation - in planning, decision making and management of all such projects to make them really beneficial to the people. The book also highlights the social, cultural and ecological implications of giant projects. Price Rs. 12 *(Environmeut Cell, Gandhi Peace foundation, 223, Deen Dayal Upadhyaya Marg, New Delhi - 110002.)*

SUBABUL CULTIVATION

(Contd. from P. 5)

Legume and Seed Output: Data collected from randomly selected 25 plants reveal that each plant produces about 200 legumes per season and maximum legume output was recorded to be 529 from the best grown tree.

On the basis of counting of seeds/pods for 300 legumes collected from 12 plants, the seed output/pod was noted to be ranging from minimum 14 to maximum 30 with an average of 24. Seed weight was calculated to 0·057 g/seed and a relative factor for pod weight to weight of seed contained in it was derived to be 0·667. In a single flowering season, subabul plant was noted to yield about 4800 seeds (200×24) weighing approximately 273·6 g.

Growth: The patterns of growth in height and thickness of stem in case of randomly selected 60 plants have been shown in Figs. 1 and 2 respectively.

Dry Weight of Branch Wood: Twenty-five samples of freshly cut branch wood collected from different plants were oven dried and the average of their moisture contents was determined to be 52·2%.

Branch, Wood and Fodder: On trimming the side branches at the end of October 1981, the 114 trees yielded 190 kg of branch wood and 75 kg. of fodder. This comes to about 1·66 kg fresh wood or ·86 kg dry wood and ·66 kg. of green fodder per tree.

Discussion: In this study, we have attempted to put forth the estimate of yield and the economics of subabul plantation on the basis of our observations and other allied studies.

As per our observations, establishment cost for the first year of plantation (including cost for excavation of pits, raising of sapling, watering etc.) and maintenance cost for each of the successive years are worked out to be Rs. 3.00/ plant and 20 paise/plant respectively.[3]

The growth of Hawaiian giant variety of subabul at BAIF, Uruli Kanchan in rocky murum soil under rainfed conditions, was reported to be 10·18 m. in height and 9.87 cm. in thickness at breast height in the span of three years and 11 months.[4]

Under all adversities, we expect an average growth of 15 metres in height and 8 cm. in thickness at ground level after 5 years. Apart from the yield of branch wood estimated on the basis of our observation, an additional income will be generated by the sale of upper half of the main stem as fuel wood. The lower half of the stump measuring about 7·5 m. can be used as a pole after felling. The volume of the upper half of the stump (height 7.5 m) with an average thickness of 3 cm (4 cm at base & 2 cm at apex) may be estimated to be 5298·7 cc. ($3.14 \times 1.5^2 \times 570$).

The average weight of each stump with a density of ·54[5] would then be 2.861 kg.

In working out the economics of plantation, we have taken into consideration the minimum market price in the local area i. e. Rs. 200/ ton for the fuel wood from side branches and Rs. 250/ ton for wood from the main stem. These values are extremely low as compared to those reported from other parts of Maharashtra (Rs. 578/ ton at Bombay and Rs. 455/ ton at Solapur.[6]

Economics of subabul plantation summarised in table 1 reveals that the initial cost of establishment and maintenance amounting to Rs 10,000 per ha. is quite high and hence may be out of the reach of a poor marginal farmer. A different strategy needs to be planned to solve this problem. One such attempt is described below—

(i) Establishment cost can be curtailed substantially if the marginal farmer and his family members are engaged in the work, thereby cutting short the labour cost.

(ii) Excavation for pits and raising of saplings can be undertaken during the slack period for the farm work thereby increasing the days of employment in the rural area.

(iii) Watering of plants in the first year of plantation constitutes the major bulk of initial capital. This expenditure can be substantially reduced if all plants are only rainfed (no manual watering). However, in this case, mortality rate of plants may go up. This, in turn, would necessiate undertaking a special study to test the economic feasibility of this proposal.

(iv) Plantation can be carried out in instalments of 500 plants per year, thereby completing the plantation in one hectare of land in 5 years. The establishment cost will thus be lowered to Rs. 1500/ year(500×3). This will also help in securing a regular annual revenue of about Rs. 5,500/- in each successive year after five years of plantation.

(v) Intercropping with cereals and other crops may also be beneficial.

(vi) The huge amount of seeds obtained from these plants can be processed for extraction of gum. (The reported gum content of these seeds is 30 per cent)[7]

References :

(1) Spears. J, S., 1978. **Wood as an Energy Source : The Situation in the Developing World.** Presented to the 103rd Annual Meeting of the American Forestry Association, Hot Springs, Arkansas, Oct. 8, 1978.

(2) Anonymous, 1980. Fire Wood Crops : Shrub and Tree Species for Energy Production, Report of an AdHoc Panel of the Advisory Committee on Technology Innovation Board on Science and Technology for International Development Commission on International Relations, National Academy of Sciences, Washington, D. C.

(3)&(6) Agarwala. V. P., et al, 1981. Energy from Trees : Potentials and Problems of Second Green Revolution in India. Report of the Technical Sub-committee of the Proposed Wastelands Development Society.

(4) Relwani, L. L., 1981. Subabul-the Super Fuelwood Tree. **Science Today,** vol. XV, no. 10.

(5) _____, D. V. Rangnekar, 1981. Social Forestry – the Second Green Revolution, **Science Today,** vol, XV, no. 10.

(7) _____, _____, Koo Babul–a Miracle Shrub for Fodder, Fuel and Timber. The Bharatiya Agro-Industries Foundation, Uruli Kanchan.

plan to sow paddy in the same way during the next season. If it is successful, cost of production will be greatly reduced. They have planted five varieties of wheat, including good local ones, instead of the Mexican-dwarf alone. These varieties are not only less dependent on irrigation and manure, but are also known to be more nutritive, disease-resistant and tasty.

Towards Organic Farming: The use of chemical fertilisers and pesticides has also been stopped and two major crops of wheat and paddy have benefited greatly from the change The paddy harvest of November 1981 was better than ever before. The average yield was over fifteen quintals per acre, and one quarter-acre plot produced 672 kgs. of paddy i. e. nearly 27 quintals per acre. The grain is heavier, healthier and tastier than before, and probably more nutritious. It is planned to continue to demonstrate the good effects of organic manures on the health and yield of plants and the quality of grain. A 3·5 acre plot has been kept for experiments in natural farming in which berseem, wheat and mustard have been planted without ploughing. After harvesting, the paddy seeds are simply broadcasted and are covered with a thin mulch of dried grass. The crop seems to be coming up well and there are surprisingly fewer weeds. By following nature's method of farming, the assistance of nature's large bands of workers-the earth worms, insects, birds and animals which aerate the earth, produce plant nutrients, control harmful pests, and gradually improve the fertility of the soil and its ability to retain moisture-is sought.

Other Activities: This year, the grain was stored in dry chaff, without the use of any pesticides. Results were excellent. Light hand-operated stone mills (chakkies) have been procured for grinding wheat and other products. A hand operated paddy de husker is also on the way. A bullock-driven oil-press will crush the oil to supply oil far humans and oil cake for animals. Increased use of these and similar implements will conserve the nutritive value of the grains which constitute the bulk of the people's food and will also provide work for local artisans. This year, two gas plants were built and an old one was repaired for the benefit of twelve families. Efforts are being made to develop inexpensive cooking burners which can be prepared by village women with local materials. Some solar cookers and a solar water-heater are in use so that they can be promoted as practicable and useful fuel savers.

Then there are daily prayer meetings, celebration of festivals and other aspects of community life. These are not isolated activities; they go together and form a whole. The purpose is to discover and practise way of living which is more appropriate for Indian villagers, and more likely to satisfy their real needs than the present unthinking aping of the city. The team believes that an essentially non-violent, simple life-style could offer a real alternative to the urban-industrial culture. But to attain it means a revolution, not so much in technology as in social attitudes and human relationships. It is this change which is its basic concern. ●●

(Contd. from Page 9)

Economics Of Subabul Plantation

Expenditure / tree

Establishment cost	... Rs 3.00
Annual management cost	... 0.20
Management cost for five years	... 1.00
Total Expenditure/ tree	... Rs 4.00

Expenditure / Revenue	No of trees/ ha. at 2 × 2 m spacing = 2500	No. of trees at boundaries of 1 ha. land in 2 alternate rows 1 m × 1 m spacing = 1000
Exp. Establishment and management for 6 years.	2500 × 4 = Rs. 10,000 /-	1000 × 4 = Rs. 4000/-
Revenue - Production of poles through stump cutting Rs. 10/- per pole.	2500 × 10 Rs. 25,000 /-	1000 × 10 Rs. 10,000/-
Production of dry wood in 5 years		
(A) from side branches	2500 × 0.86 × 5 = 10.75 tons	1000 × 0.86 × 5 = 4.3 tons
Revenue (Rs. 200/- ton)	Rs 2150/-	Rs. 860 /-
(B) From main stem	2500 × 2.861 = 7 152 tons	1000 × 2.861 = 2.861 tons
Revenue (Rs. 250/- ton)	Rs. 1788 /-	Rs. 715.25
Total revenue from dry wood	Rs. 3938 /-	Rs. 1575.25
Green fodder is 5 yrs.	2500 × 6.6 × 5 = 8.25 tonnes	1000 × 6.6 × 5 = 3.5 tonnes
Revenue for G/fodder. Rs. 100 /- per ton	8.25 × 100 = Rs. 825 /-	3.30 × 100 = Rs. 330 /-
Seed production in 5 years (0.5 kg / tree/ year)	2500 × 0 5 × 5 = 6250 kg.	1000 × 0.5 × 5 = 2500 kg.

NEWS & VIEWS

POVERTY AND FAMINE : Existing methods of analysing the devastation caused by famine do not study the relationship of people to food : Instead, they focus mainly on the quantity of food available per head of population. Some people have enough food because they possess entitlements to things that can be successfully exchanged for food, while others have none at all. Because whatever entitlements they might have (including their own labour) are not marketable, precisely because of the situation that has caused the famine. Although current trends indicate that enough food exists to feed all the world's people, famines and starvation could occur, for reasons not directly connected with food production at all. Famines may occur not because of a slump in food output, but of other goods, reducing the ability of those engaged in occupations other than food production, to obtain food. *Amartya Sen in "Poverty and Famines" An Essay on Entitlement and Deprivation, An ILO World Employment programme Study.*

MANY PUNJAB FARMERS STILL BELOW POVERTY LINE: Despite the 15-year-old green revolution, about one-third of marginal and one-fourth of small farmers in Punjab are living below the poverty line, because of their small land base. Due to the highly skewed distribution of land holding in Punjab, farm business income is also distributed in an inequitable manner. However, as the small and marginal farmers are able to obtain relatively high r per capita income from non-farm activities, the distribution of household income is much less inequitous than land, or farm income distribution. Despite their best endeavour, the marginal and small farmers are unable to earn enough to meet their consumption needs. On the other hand, large and very large farmers are recording substaintial savings. But only a fraction of these are being used for capital formation in agricultural or even in house construction. No information exists as to how the rest of the surpluses are being utilised. The availablity of these surpluses has further enhanced the economic and political power of the upper middle and large farmers. - *Findings of a joint study conducted by ICSSR & Punjab Planning Board, H. T., March 9.*

COST OF WAR : The world has lost more than ten million people in and spent roughly 7,500 billion U.S. dollars on about 150 wars fought the past 35 years. It is in addition to the losses caused by the two World Wars in which the number of deaths, cripples and costs of material lossess were 10 million & 50 million 20 million & 40 million and 360 billion dollars & 4000 billon dollars resp. Nine schools can be operated with the cost of one F-14 figther; one hydropower station with the cost of one aircraft carrier, 36 three room, flats built with the cost of one Leopard-2 tank, one year schooling for 16 million children with the cost of one Trident submarine and five haspitals with the cost of one MX intercontinental ballistic missile. - *Report from a Moscow weekly 'New Times'.*

KVIC TO PROVIDE 5 MILLION JOBS : The Khadi & Village Industries Commission plans to provide five million jobs by the end of the sixth plan. Khadi production in 1981 reached Rs. 104 crores as against Rs. 8.28 crores in 1956. Village industries production went upto Rs .418.93 crores during the same period. The commission also plans to double its Khadi production to Rs. 200 crores and treble the village industries production to Rr. 1,000 crores during the sixth plan period.

INDIA GOES DOWN IN THE SCIENTISTS' POOL : India is no longer the third largest scientific and technical manpower after the US and the USSR. The tiny nation of Japan has ten times more manpower engaged in research. Among the countries in Asia, India has the lowest number of scientists and engineers per million population. The per capita expenditure on research and development in India is also one of the lowest. There were only 54,105 scientific and technical personnel in India (575,068 in Japan) engaged in research and development in 1979. Out of them, excluding technicians, only 28,233 were scientists and engineers (Japan 418, 046.) Only 47 out of a million in India are scientists and engineers, a figure which is lower than that for Indonesia (57), Iran (159), Korea (418), Pakistan (63), Philipines (97), Sri Lanka (161), and Japan (3,608). Three-fourths of the entire R. & D. personnel in Asia are Japanese. Almost 90 per cent of the entire expenditure on R. & D. in Asia is made by Japan alone. India's per capita expenditure on R. and D. - one dollar is lower than that of Japan (82), Korea (10), and New Zealand (39), but is more than that of Pakistan and the philippines. Although India is producing a larger number of science graduates than most countries except Japan, many of them are not really engaged in research and development activity. *Findings of a document prepared by UNESCO office of Statistics for the Second Conference on the Application of Science and Technology for Development in Asia and the Pacific (CASTASIA-II) held in Manila on March 22.*

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ABOUT US

CSV News / Announcements / Appeal

Dear friends,

It has been long since we have been meeting through this column. The sizeable number of letters daily pouring in the SFV office is a sure sign that you ARE concerned with SFV and ARE anxious to know about the happenings at CSV. In spite of our best wishes, we are unable to answer all the letters which we receive. Hence, I felt why not write a long letter every month to all of you? Let us hope tha tthis form would make our dialogue more lively and meaningful.

To begin with, the highlights of the last month :-

Notwithstanding the scorching heat of blooming summer, pleasant winds are blowing in this part of the land. And whether there are cool breezes or hot fumes, they are helping in making our campus more green and cheerful. Thanks to **the wind mill** installed in our Dattapur campus last month by the kind courtesy of Government Polytechnic, Allahabad. The work of installing five such windmills in other parts of Wardha district and fitting the electric motor to windmill in Dattapur is rapidly in progress. Windmill is a rare entity in this part of the land. No wonder it has become an object of curiosity for the passers by. Data of functioning of this six windmills will be fed to Allahabad Polytechnic by CSV.

This being the Drinking Water and Sanitation Decade celebrated the world over, we, at Wardha are contributing towards it in a humble way. A scheme for **converting bucket type latrines into 'Sopa Sandas'**- the cheapest form of 'Nirbhangi' latrines - is under way in Wardha town for the last four months. Under this scheme, the Municipal Council provides a financial aid of Rs. 200/- per latrine and CSV provides the technical help needed for conversion, which becoems almost free of cost to the house owner (For details of conversion process, please refer to SFV, Jan. 82)

There were many **visitors** too. Although the Prime Minister could not include CSV amist her hectic programme of visiting Paunar on April 10, she, however, accepted the garland and the literature presented to her on behalf of CSV. Then, there were *scientists attending the National Seminar. On Crystallography* at Nagpur who spared some time to meet us. *Prof Dinesh Mohan, Director CBRI* and *Dr. Sunderesan, Director NEERI* were among the other friends who met us in the last month.

There is one more friend - *a visitor from Overseas*, who has stayed with us for more than a year and we have started liking each other. You will find more about this friend from Philippines - **the Subabul planted in Dattapur Campus** - on page 3 of this issue.

And now a few important announcements : **Beautiful Greeting Cards* *(for all occasions) made from banana fibre handmade paper* are ready for sale at CSV. Kindly hasten to place your orders (Rs. 1/card + postage) to avoid disappointment.

*In accordance with the consistent demand of friends and with financial assistance of DST, we happily annonce the starting of a HINDI MAGAZINE- GRAMOPAYOGI' VIGYAN FROM AUG. 15, 1982. This magazine meant specially for the voluntary workers in rural areas will not be a verbal translation of SFV; although matters of common interest to scientists and social workers will appear simultaneously in Hindi and English bulletins. Kindly send suggestions, subscriptions (same as SFV bull.), addresses of friends who may be interested in subscribing and articles for this magazine.

*Next issue of SFV will be a 'KUMARAPPA SPECIAL' commemorating the KUMARAPPA MEET-III at Wardha. Please send us articles and memories about Kumarappa.

Lastly, a word of thanks for your enthusiastic response to questionnaire, a promise to give a new look to SFV taking hints from your replies.

More when we meet next month.

Cordially,
Ravindra

P. S. : A request for busy friends - PLEASE SEND BACK THE QUESTIONNAIRES FAST.

HOW YOU CAN HELP US -

* Send for publication your experiments and experiences or information in rural technology you come across.
* Enrell subscribers (annual subscription for individuals : Rs.15/- and Institutions : Rs. 25/- in India and for abroad, US Dollars 10 and 15 respectively) by sending addresses whom a free sample copy will be sent.
* Solicit appropriate advertisements to help financing this publication (Rs. 1000 for full page, Rs. 500 for half and Rs. 250 for quarter page per insertion).

Please write to: The Editor, Science for Villages, Magan Sangrahalaya, Wardha- 442001, (M.S.) INDIA.

Cover pages printed on Hand Made Paper made from Banana Fibre at C. S. V., Wardha : Printed and published by Shri Devendra Kumar on behalf of Science for Villages, Wardha. Managing Editor : Shri Ravindra, Chief Editor : Devendra Kumar, Editorial Office : Centre of Science for Villages, Magan Sangrahalaya, Wardha, Printed at Majestic Printing, Press, Nagpur.
Regd. No. WDA-119

SCIENCE FOR VILLAGE

VOL. V, No.10

July 1982

S & T NOT FOR DESTRUCTION

The great leader of India's freedom struggle-Maulana Abul Kalam Azad, addressing the 26th January 1946 Independance Day function at New Delhi, at which the author had the chance to be present, stressed on the fact that change was the law of life and that no nation could remain static as that will mean death. A free India, he said will be a living vibrant country in the state of perpetual change: evolving, moving and active. He however warned that for having a right direction in our development, we will have to be guided by those who could see to the long range good of the nation i. e. the common man. This was typical of the sentiments of our founding fathers and so should always guide the conscience of those at the helm of national affairs.

Pandit Nehru believing in the above desired direction of change laid great score on the potentialities of science and technology as a means to bring it about by tremendously accelerating the processes through tools of research and development in every field of the economy. He wanted the execution of national developmental plans being guided by the foresight provided by science and technology and used to say that as eyes see before steps fall, so also science and technology should give as the fore-sight to base our national priorities.

But what our great idealists dreamt has been belied by what unfolded in history. Science & Technology provided not only the tools of fore-knowledge, but also became the architect of a fast changing world, this world despite the widening horizons of objective truth that science opened up, became progressively clouded by the growing subjectivity created by human weaknesses of competition, over consumption and love for wealth and power, and thus the vested commercial and political interests reinforced each other to vitiate the path. The compass of science could not guide our technology and we are witnessing continuing wars periodically spurting up in big conflagrations and the threat of a haulocast hanging over our heads like the sword of Demoscus. Whether on global or national scales, these influences seem to prevail with equal intensities. We see the intriguing phenomenon where on one hand, the world speaks of a just society and ecologically balanced world with a New International Economic Order (NIEO) and on the other that approximately 20 per cent of the world's qualified scientists and engineers engage themselves directly in military research and may be the same percentage would be connected indirectly to Arms Race in some form or other. We are told around Rs. 28,000 crores or approximately one – quarter of all world expenditure on S & T is spent on Defence Research and 85 percent of this is accounted by U. S. A. and U. S. S. R. but rest of the nations are also not blameless as they too spend on defence research and arms according to their economic capacities and priorities.

World-wide military expenditure in 1981 was more than 520 billion dollars (Rs. 416,000 crores) representing 6 percent of the world total output and equivalent to all available combined investible capital in the Third World. How poor countries have also been sucked in this vortex is clear from Stockholm International Peace Research Institute's studies, which reveal that our own country is in an uneviable state.

(Contd on page 5)

from the labs

In this column, we invite techniques evolved in the labs of India as can benefit the villages and help in creating a new order.

Portable Power Ghani : A portable rotary type power ghani which does not require any foundation for installation or superstructure has recently been developed by the *Directorate of Village Oil Industry of the KVIC with the assistance of the Carpentry and Blacksmithy Directorate.* It can be shifted from one place to another according to convenience of the operator and be commissioned within a day after the receipt of machine at the destination. Wooden fatcher and pestle are fitted in this rotary type power ghani itself so that the artisan /operator is not required to look to any other source. This model is comparatively more efficient (yield is more by 0.50 to 0.75 per cent and needs about 10 per cent less crushing time, in comparison to overhead power-drive). It is fitted with appliances like Ammeter, Voltmeter, starter with single phasing prevention device and pilot lamps (indicating flow of current in all the 3 phases). The compact model occupies only 4'X3.75' floor space with a height of 5'. Incorporation of starter / cake cutter in this model will enable the operator to operate two such ghanis simultaneously without any difficulty.

– (JAGRITI – 1st June 1982.)

Breast – Feeding Provides Immunity : Even when a mother has an infection, breast-feeding is beneficial. In most cases, the babies will receive the anti-bodies through the mother's milk according to a study conducted at the *Nair Charitable Hospital, Bombay*. The findings have been circulated by the Ministry of Education & Social Welfare, highlighting the fact that the babies receive the requisite protection also, if they contact infection from the mother. No such protection is available for bottlefed babies.

(H. T. May 28)

Useful Wild Plants Facing Extinction : Nearly 5,000 useful wild plants are sliding into extinction as a result of changes in agricultural pattern and denudation of forests. Indiscriminate use of weedicides and pesticides as also variations in ecology due to changing agricultural pattern were the two threatening factors. Wild plants had been put by the tribals and poor men for hundreds of years to a variety of uses including food, fibre, medicines, oil, fuel, dyes and detergents etc. While food production had been increasing gradually, these wild plants which could also be made use of in a similar manner had been diminishing day by day. Eighty wild plant species-rootsr tubers and rhizomes were eaten in various parts of the country in almost all climate regions. The giant Taros and Yams were eaten raw or cooked, bulb powder was used with flowerwhile some parts of plants were also used as condiments or were added as flavour. Similarly, there were nearly 250 wild plants species comprising herbs, shrubs and trees of which leaves and shoots were gathered and eaten raw or cooked. *Dr. Vishuu Mitra, Senior Asstt. Director, Birbal Sahni Instt of Paloe Botany, (BIEP), (Hitavada, June 17)*

Biomass Assessment In Third World Villages : *Seshadri,(CV) and others (A.M.M. Murugappa Chettiar Research Centre, Tharamani, Madras – 600042)*, using a systems analysis methodology, have found out that under the conditions simulated for an existing Indian village, food consumption can increase by around 200%, indigenous energy production by 85% and overall solar energy by just over 150% all within 12 years even with a population growth rate of 2% per annum. Should such a strategy for decentralised development be extensively adopted, then it could benefit a significent proporation of the people currently living in the rural areas of the Third World.

Solar Drying : In a paper published by *Centre for Energy Studies, IIT, Hauz Khas, New Delhi,* it is discussed that the principles of drying and the types of solar dryers such as open sun drying, rain protected drying, integrated solar dryers and air heaters, detachable (indirect) air heaters and dryer units, grain dryers etc. requires consideration of various factors to develop simple solar paddy drye, and the overall technological development of solar dryers in India.

Dehydrated Pineapple Fruit : For drying pineapple fruits, a new technique known as 'osmo-sir dehydration' has been standardized by CFTRI. In the first phose, the fruit is immersed in concentrated sugar syrup to remove large part of its moisture content (loss in weight about 50 percent.) The next step, is further dehydration in an air circulation drier to reduce the moisture content to about 15 per cent. The dehydrated product is almost like fresh fruit as regards colour, flavour and texture. The sugar syrup could be recycled upto six times after which it could be converted into pineapple syrup with an acceptable flavour. The pineapple juice obtained as a by product is to the extent of 10 per cent. *(Central Food Technological Research Institute, Mysore – 570013)*

VIEW POINT

FOREST POLICY : NEW BILL FOR WHOM ?

NEERJA CHOWDHURY *

Environment has been a topic of interest for many of our readers. The proposed forest bill is the thundering storm creating controversies in all circles concerning environment. Here we present the view point of a committee representing a dozen voluntary groups—activists, academics, lawyers and journalists from across the country. Reactions of consentious readers on such a matter of decisive importance are welcome. —Ed.

The Forest Bill 1980 seeks to replace the Indian Forest Act of 1927. Though it has not been introduced in Parliament yet, it has elicited widespread opposition, particularly from those who have for long been working among the adivasis and forest dwellers and as a result are aware of the adverse effects it is going to have on them. It would convert forests into virtual mines to provide raw material for industry and commerce. By seeking complete control over the forest, the Bill would not just totally destroy the tribal mode of life and economy, but would also add millions of unskilled workers to the vast unemployed labour market. If the adivasis are alienated from their own habitat they can be exploited as virtual slave labour and the women forced into prostitution. The inflow of this large number of uprooted adivasis would have direct repercussions on the unorgainsed rural labour force, reducing them also to near slave conditions. Therein lies the seriousness of the proposed legislation, for it spells disaster and destitution for adivasis.

ADIVASI RIGHTS : Before 1865, forests belonged to the adivasis. But even subsequently, after the Imperial Government took them over, the law recognised the collective rights of adivasis in these forests. Later, these collective rights shrunk to just individual rights. As the value of forest produce increased commercially, the rights of adivasis became mere concessions. And the tragedy is that the present Bill looks upon the adivasis as thieves in their own traditional habitat. According to the provisions of the Bill, entering reserved forest without a permit would be considered a crime. Carrying away firewood, cultivating forest land, cutting fodder, plucking fruits, flowers and roots, gathering leaves and fishing would be considered as offences. If a woman, who today trudges long distances carrying a bundle of firewood to town to earn a few rupees is caught, she would be jailed and fined. And whom would the Bill benefit ? The merchants, contractors, industrialists and Forest Department officials. The most frightening aspect of the Bill is the excessive powers it gives to the police and forest officials. It would have even more far reaching consequences than MISA, NSA or ESMA, for it combines the judge, jury and the prosecutor into one with no right of appeal given to the accused. It entitles the forest officer to arrest any one on the slightest suspicion of an ofience without a warrant, and for the holding of summary trials by him. As it is, the Forest Department is law unto itself. The Bill also empowers the Department to declare virtually any area as forest land. Till now, its powers were restricted to natural forests, but now it is to be responsible for the care and felling of trees whether they are on private or government land, in villages or in cities. The colonial nature of the Bill is established by the fact that it views people not as a part of the development effort, but as groups to be governed by the bureaucracy. Consequently, such a legislation creates sanctions and offences for individuals or groups, but not for the administration violating the norms

Design of an Alternative Bill : The forest dweller should be consulted in the framing of the law. Discussions with groups across the country should be presented in Parliament in the form of counter proposals contained in a kind of White Paper. The Bill should provide for a method of effectively communicating legal decisions to the people for whom they are intended. Major powers under the Act sould not be exercised without a representative or group hearing. Their difficulties should be conveyed before decisions are made and not afterwards; other-

wise decisions such as relocation and resettlement can mean disaster of the already destitute. It should provide for special punishment for the deviant administrators. Special offences should also be created for the violation of the law by the State and private agencies. It should provide for legal services to the forest dwellers, since courts are distant and their process dilatory.

Social Forestry : It is necessary to abolish the myth of social forestry as is being developed by the government. Its main aim is to safeguard monoculture that is commercially valuable. The case of the draft Social Forestry Project in Rajasthan is a good example. The Rajasthan Government plans to grow trees on 50,000 hectares of land; half of this would be constituted of narrow strips of land along the sides of roads, railway lines and canals. This is to be protected by barbed wire stretching over 10,000 km. The remaining 25,000 hectares are to be afforested in villages with the Forest Department taking over panchayat lands and declaring them protected by cordoning them off with barbed wires. How people oriented the Rajasthan project is likely to be can be shown from the items of expenditure planned and the kind of trees to be planted. Out of the total amount of Rs. 511.5 million to be spent and raised from the World Bank, the cost of barbed wire is expected to be Rs. 88.7 million, salaries of Forest Department officials and the establishment Rs. 80 million and that of the buildings 15 million, Rs.8 million for training and fellowships abroad to acquire know-how and Rs. 4 million for vehicles. In fact, just under half its outlay, Rs. 215 million, is to be spent on the overheands; Rs. 96 million is allocated for the plantation. And what kind of trees are going to be planted ? Instead of a mixed forest, which also has the capacity to preserve itself unlike mono-culture, trees of commercial value are being planned from which the local people can derive little benefit. There's neither forest nor anything social in the kind of social forestry.

The Alternative Social Forestry has to be considered, keeping the adivasi and the forest dweller in the centre of the picture Today they are considered interlopers and potential criminals. In turn, they view the Forest Department as a 'dalal'. The first task of the Forest Department should be to win the confidence of the adivasi even if it results in a temporary loss to the state exchequer. To achieve this goal, *a moratorium on all forest felling* is suggested. The consequent financial loss entailed would be "marginal" when compared to the losses accrued from deforestation every year. Industry would no doubt lose its supply of raw material, but then private enterprise would be forced to develop substitutes. There is nothing to stop it from creating its own plantations to meet its raw material needs for which the government could allot it certain degraded forest. The moratorium may remain in effect till all degraded forests are replanted. This would also pressurise the timber trade to hasten the process of afforestation. But, above all, the forest dweller has to be involved in preserving the forests; he must feel that he has a stake in their regeneration. Today he is indifferent because they have been taken out of his possession. His alienation has created in him a resignation towards continual deforestation It is high time the administration realised that those liked to the forest are the ones who will conserve it. It is impossible to police the forest. It is equally futile to expect regulation and penalty to deter illegal timber trade, especially when the stakes are high and risks low thanks to colluding forest officials. It is also suggested that the Employment Guarantee Scheme and Food-for-Work Programme be geared totally to tree plantation.

* (Abstracted from Voluntary Action, May 1982.)

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EAT ARMS, NOT FOOD : International commitments to increase the flow of financial resourcest to developing countries were being steadily subord-inated to national interests. The ploughshares are being beaten back into swords, as witnessed by the spiralling arms race. Collective security is being sought, not in food but in guns. The North must be convined that helping the South would not only benefit economically itself but underestimate their own role in the development process and allow themselves to become totally dependent on assistance from the North.

EDOUARD SAOUMA, FAO CHIEF (TOI, April 20)

Editorial : Continued from page no. 1 –

India's military expenditure has also skyrocketed from 1443 crores in 1977 to 3518 crores in 1980, and in 1981, this figure will be higher than 4200 crores, that is around 17 percent of our total budget. India, according to the same sources, accounts for 75 percent of the total arms import in the South Asian regions and is currently the 8th largest arms' importer in the Third World.

The grave compulsions in the situations we will find lie in the capital intensive, centralized, controlled, export- oriented, mineral based economy we are keeping as our model. These force nations to bleed themselves white to feed their defence budgets and consequently their R & D components. We, being interested in the utilisation of S & T resources to be available for helping to bring the 44% of our people living below the poverty line to come up above it, naturally feel ill at ease when we see our country too getting itself embroiled in the arms race and our meagre R & D resources being dissipated to that end. It is a matter of grave concern that as we discern the trends in national expenditure on R & D and related scientifice and technological estimates from 1948-49 to 1980-81. (Source : R & D Statistics 1978 79, DST, New Delhi, 198). The following trends come up –

The R & D and related S & T activities expenses have been given greater percentage of the GNP year after year, beginning from 0·23 percent in 58-59 to almost thrice i. e. 0 64 percent in 78-79; in money terms it means a jump from 188 crores to 321 crores in R & D by major scientific agencies. Looking nearer in time (1976-77 to 1978-79 period), it shows an increase from around 326 crores to 418 crores i.e. an increase of 37.4 percent. Out of this, Defence which accounted for 20 percent of this total budget made in these three years had a jump of 61.3%. Thus though the share of S & T has gone up, it has been soaked up by non-productive (or destructive) areas of human activity more and more. To reverse the trend, the change towardes an ecologically balanced, non-competitive (self-sufficiency oriented) economy will have to be the aim of our S & T eye, which as per Pandit Nehru, should guide our future steps.

Devendra Kumar

WATER RESERVOIR FOR A FAMILY.

Shortage of water for drinking or household use is one of the biggest problems faced by the villages of the Third World. Scientists from GRET, France, ~~France~~ currently working in W. Africa Have successfully employed a technique for collecting & purifying rainwater in a family-size reservoir using very low investments & simple techniques. We, at CSV wish to try out the same technique, using bamboo in place of polythene. We reproduce it here with a hope that other interested friends may try out this technique & send to us their experiences after completion of the experiment.

Materials (For a 4000 Lt. reservoir)

i) Cement – ½ Bag (ii) Polythene pipe – 6 m. long. dia 1·18 m. (iii) Nylon cord – 4 m.m. thick 2 m. long thick – 120-150 micron. (iv) Bricks – 100 v) Water – 50 Litres (vi) Sand – ½ cu. M. (vii) Polythene bag: Dia 114 cm.

PROCEDURE

1) Foundations :- i) Draw two concretric circles of radius 62.5 cm. and 83 cm. Dig a ditch of 20 cm. depth and 20 cm. width between the circles and fill up with concrete (1:2:4)

2) When the concrete is dry (2 days), dig the hole strictly vertically to 3·5 m. depth from the foundation and 30 cm. at bottom to obtain a cone.

3) If the surface is uneven, apply some clay to have a regular surface.

4) Slide the tube of bamboo up to 30 cm. depth which has to pass the foundation and narrow the bamboo to 110 cm. of diameter.

5). Put clay if there are large spaces between soil and bamboo.

6) Cover the bamboo with clay to have regular surface and apply mud on the inner surface of cone.

7) Build a little circular wall with bricks. (20 cm. high)

8) Take a double ligative polythene bag invert it to have the ligature inside.

9) Slide the bag in the hole. Put 30 or 40 litres of water to be sure that the bag is at the bottom: cut the polythene at 15 cm. over the top of the bamboo and fold it over the bamboo. Avoid holes in polythene.

10) Fix polythene to bamboo by increasing the height of brick wall.

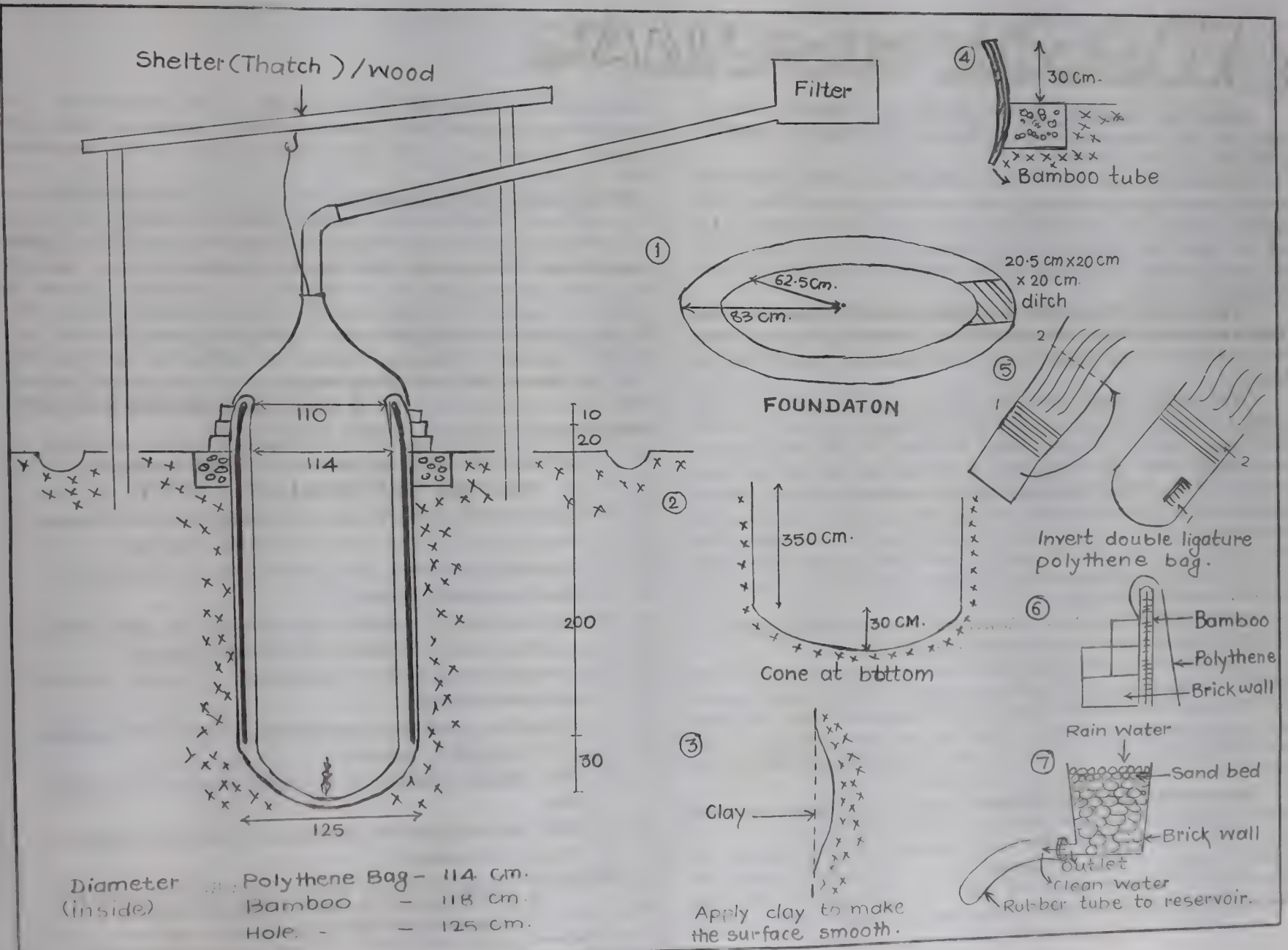
11) Place of polythene sheet in form of a cap over the polythene covered bamboo.

12) Tie the plastic cap to the thatch by means of a nylon cacord. (The thatch serves to protect the polythene from excess heat & other damage.)

13) Connect the cap to the filter by means of the rubber tube. (The filter consists of a bed of sand & gravel surrounded by bricks)

INSTRUCTIONS :- Avoid the collection of first showers of rains as the may contain the mud covered on the roof.

CENTRE OF SCIENCE FOR VILLAGES
MAGAN SANGRAHALAYA,
WARDHA(M.S.) INDIA-442001.


Shelter (Thatch) / Wood
Filter
110
114
125
10
20
200
30
Diameter (inside)
Polythene Bag - 114 cm.
Bamboo - 118 cm.
Hole - 125 cm.
④
30 cm.
Bamboo tube
①
62.5cm.
83 cm.
20.5 cm x 20 cm x 20 cm.
ditch
FOUNDATON
⑤
2
1
2
1
Invert double ligature polythene bag.
350 cm.
30 CM.
Cone at bottom
⑥
Bamboo
Polythene
Brick wall
Rain Water
⑦
Sand bed
Brick wall
Outlet
Clean Water
Rubber tube to reservoir.
③
Clay
Apply clay to make the surface smooth.

BOOK WATCHING

Resettling America : *(Energy, Ecology and Community : Gary J. Coates, Ed, Brick House Publishing Co., 34 Essex Street Andover, MA 01810, pp 560, Price 14.95 U. S. dollars)*

The basic premise that winds its way through the pages of this book is that residents of the human environment must collectively integrate their lifestyle gracefully and intelligently with the natural system on which all life is based. The book is fill d with optimism for the future, a sometimes rare quality. Its joyful, holistic approach, coupled with excellent illustrations and photoes, adds up to lots of enjoyable reading.

Better Use of Your Electric Lights, Home Appliances, Shop Tools-Everything that Uses Electricity *(Michael Hackleman, Peace Press 3828 Willot Avenue Culver City, CA 90230, pp 166, Price 9.95 U. S. dollars.)*

The book fills the gap of information needed to reconcile the use of all those appliances and devices that require 120 volt, 60-cycle AC power with the low-voltage DC system you want to, or have, installed. Throwing out the "energy guzzlers" can be a costly, wasteful, and often impractical solution, and one that may not be necessary given the wealth of information Michael Hackleman offers here. Many of these items can be redesigned to perform the same function, but use less energy. In this systematic, item by item approach, the author appraises not only water heater, lights, refrigerator, washer, dryer, stereo, TV, shop tools and rest, but also finds ways to adapt them to low voltage with minimum effort. A boon not only to DC users, but to all concerned with energy conservation,

The Solar Bibliography : *Volunteers inTechnical Assistance (VITA), 3706 Rhode Island Avenue, Mount Rainier, MD 20822, pp. 113.)*

The editors have pulled together 500 of the best recent publications that are available through regular channels covering such subjects as water supply manuals and mini-hydroelectric turbines from Nepal to earth construction books from France and Australia, this book will come to the aid of the back yard inventor, Peace Corps volunteers and students all over the world. It will direct the reader to that hard-to find piece of information he may be searching,

Progress as if Survival Mattered *(Friends of the Earth, 124, Spear Street, San Francisco, CA 94105 pp 456, Price 14.95 U. S. dollars)*

Friends of the Earth, the 27,000 member environmental group, published the original "Progress" in 1978. A Completely revised and expanded edition of thi "Hand-book for a Conserver Society" has been made avilable just in time for ths first anniversary of Ronald Reagan's inauguration. It presents a new programm e-economic, social, personal, and political-for people who care about survival. The book is divided into three main sections and over forty chapters and essays, with hundreds of recommendations for specific action by voters, activists, homeowners, public interest groups etc.

Fuel wood and rural energy : Production and supply in humid tropices by R. p. Mose and w. B Margan published by United Nations University, Tywoly International Publishing Ltd., 17 Gilford Road, Sandymount, Dublin 4, Ireland 1981. **Surface Water Filtration for Rural Areas** :- Guidelines for design, construction operation and maintenance by N. C. Than and J. P. A. Hettiaratch published by Environment Sanitation Info mation Centre, P. O. Box 2754 Bangkok, Thailand 1982. **Appropriate building material** by Roland Stulz, published by SKAT, SWiss Centre Appropriate Technology, Varnbuelstr 14, CH-9000 St. Gall/SWitzerland 1982. **Manual for rural Water Supply :** with many detailed constructional scate drawings by SKAT, 1981. **Locel Experience with Microhydro technology by** Veli Meier Published by SKAT, 1932,

HOUSES FOR THE RURAL POOLR

-Shri G. C. Mathur
Director, National Building
Organisation (NBO)

Providing a shelter to millions is not a mean task. Providing a safe. durable and comfortable shelter at a low cost is much more difficult. Here the Head of the national body devoted to this task describes the challenge & the achievements.

Of the total housing stock of 7.44 crore dwelling units available in 1971 in rural aress, 0.8 crore dwelling units were unserviceable kutcha, 2.44 crore were serviceable kutcha, 2.79 crore were semi-pucca. and only 1.41 crore units were pucca. Therefore, the usable or livable housing shortage in rural areas is about 17 million units in the beginning of 1981. Apart from the poor qua- lity of house, congestion is also a problem. The average household size was 5.6 according to 1971 census and it was further estimated that about 76 percent of the rural households had 1 or 2 rooms.

It has been estimated that 76 percent of the rural households had-no built-up latrines. Sources of water which may be exposed to the risk of pollution available to the households are about 65.3 percent from wells, 12.7 per cent from tanks and ponds, rivers etc., 15.6 per cent from the tube wells and hand pumps and 1.2 per cent from other sources. NBO is constructing demonstration rural houses along with environmental improvements in selected villages in different regions in the country. So far 26 clusters of 20 demonstration houses in selected villages have been put up by National Buildings Organisation's Regional Rural Housing Wing.

Some innovative construction techniques and improved use of local materials for building houses at cheap cost have been demonstrated in thesse projects. These include water proof mud plaster over mud walls to protect them from erosion caused by rains; use of stabilised soil blocks for building more durable walls; fire retardant treatment of thatch; preservative treatment of bamboo; use of asphaltic roofing sheets as a replacement for thatch roof in hot and humid regions, coastal areas as well as cold and hilly regions; use of secondary species of timber after seasoning them; adoption of precast stone block masonry; precast brick panel roof /floor etc. for economical use of these materials.

Out of an estimated 12.5 million eligible landless families, house sites have already been allotted to about 8.6 million families by the end of March 1981. The number of eligible families needing housing assistance would go up to 14.5 million. The Sixth Plan proposes to provide sites to all the remaining landless families. Provision is being made for Rs. 250 per family for developed plots, approach reads and masonry tube well for each cluster of 30 to 40 families. Construction assistance is expected to amount to Rs. 500 per family. This assumes that all the labour inputs will be arranged by the beneficiaries. These provisions involve a total outlay of Rs. 354 crores for the programme - Rs. 170 crores for the provision of sites and about Rs. 184 crores for construction assistance.

NBO has evolved a typical design of house based on the minimum needs concept and is suitable for plots of size 6m×13.7m (100 sq. yds.) which are being allotted to the landless agricultural workers. In a plinth area 20 sq. metre, the accommodation provided consists of one room (2.7×4.1 m), a covered cooking space (1.5 × 1.8m) and platform (1.75m × 2.m). Nine Regional Centres for research, training and extension in rural housing are located at Vallabha Vidyanagar (Gujarat), Bangalore, Chandigarh, New Delhi, Howrah, Srinagar, Jodhpur, Trivandrum and Varanasi. These centres have so far conducted over 250 training cources for technical personnel, & Block Development Officers, thereby imparting training to over 2,600 in-service persons from different states. ▣ ▣

WINDOW TO THE WORLD

Science for Villages is not an isolated effort. It is a part of a world-wide movement of A. T. Here is an account of the ideas and activities of the birds of the same feathers from overseas.

News From Japan Power Plant Vs Power Plant : In December of 1979, a windmill started supplying electricity to the home of Hiroshi Masaki after two years of living under kerosene lamp light. Mr. Masaki, who lives in Date City in southern Hokkaido, begau refusing to pay a very minute portion of his electric light bill in protest over the building of a massive new oil-fired electric generating plant resulting in destruction of shell fish beds and reduction of the natural beauty of area. For two years, this 4?-year-old school teacher substratracted two Yen 0.8 cents from his bill and paid the rest as a symbolic form of protest. Then, the power company cut off his electricity and he was left in the dark without power. His struggle in the anti-power plant movement for ten years had the support of scientists and lawyers from all over Japan as he took legal battles with the company. The cost of wind generator which will last for more than seventy years was 8,000 dollars, and was contributed by supporters of the protest from all over Japan.

Windmill Ponds : In the beginning of 1980, Mr. Ui b gan using wind energy to improve the performance of a trickling filter-activated sludge plant in a Izumigawa factory of meat processing. The wind is strong in the area in winter. Most earlier studies on wind energy were concentrated in the field of electricity generation, which required batteries for a stable supply of electricity. As far as he knew, there was no application of wind energy directly to water treatment. Ammonium nitrate in domestic sewage and meat-processsing waste water is oxidized microbiologically into nitric acid by supplying an excess of oxygen through his method of wind agitation. The new pond for the Ham Co. has two Sabonious type windmills equipped with other aeration devices. These will substitute some one percent of the energy supply neeessary for waste treatment during peak periods. Then we can know how many wind mills will be necessary, some 50 percent of the energy input will be substituted by wind.

(Based on a report by Fumihiko Satofuks)

Seed Planter : A simple, low-cost, pedestrian-operated rotary injection seed planter offered by a British firm can inject virtually any type and size of seed directly into the soil, even through a surface mulch of crop and weed residue in an unploughed field. This reduces soil erosion by permitting the use of rougher seed beds, compared with conventional cultivation. In addition, the system is claimed to provide correct plant populations and higher crop yields because seeds are distributed evenly at regular spacings and at the correct depth. (Contact ; Hayters Ltd., Spellbrook, Bishop's Stortford, Hertfordshire CM23 4BU. England.)

Chootha Family Cocker : The Pakistan Design Institute (PDI), has developed a family cooker which is easy to operate and which can be set up in an hour. A wide range of substitute materials can be utilised so that the stove can be manufactured by local village craftsmen. A detailed instruction booklet for PDI-FC construction and installation is available. (Contact address : Mr. Christoph Adam, Pakistan Design Institute, 16 Muslimabad, Karachi 5, Pakistan.)

The Pot That Cleans : An award-winning pot invented at Central American Institute of Research and Industrial Technology in Guatemala, may help making safe, clean water available in rural areas at an affordable cost. The pot is actually a filter made of clay containing another clay container. The clay of this inner pot is mixed with silver colloids that provide a disinfectant action. Water poured into the inner container filters through into the larger one. The efficiency of this simple system in removing pollutants and bacteria is said to be excellent. The filter is simple to make and can be produced for about 9 U. S. dollars. Its effective life is about one year, supplying enough drinking water for a family of four.

(–IDRC FEATURE : 12.4.82)

Pea–Wheat : A plantMixed of Parentage : A husband-and-wife team in China has developed a hybrid between pea and wheat, which grows faster and gives higher yields and protein content than normal wheat and is also very resistant to cold at high altitudes. *Zhang Siven*, and his wife *Li Zhongxian*, working at a research station in the Qinhai-Tibet highlands, where the frost free season ranges from 5? to 90 days experimented in 1971 on 2000 crosses between pea and spring wheat and produced one fertile hybrid result the following year. Pea-Wheat-the hybrid, distributed widely in China, is being sown 2000 hectares

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NEWS & VIEWS

K. N. Raj Pleads for Catlle Protection : The view that opposition to cattle slaughter sprang from irrational religous beliefs is incorrect. 'The sentiment against cattle slaughter in countries like India and China is rooted in more tangible economic consideration. This is clear from a number of sayings including those from Gandhi, Mao and Karl Marx. Animal wealth is a national asset of an agricultural country like ours, where the need for oxen is dominant in the calculations of our farmers. If this wealth is allowed to be destroyed by the present unsystematic animal slaughter, it could create havoc with our agricultural economy, which is already in a mess. The agricultural economy crisis facing our country cannot be met by traditional thinking that the diseconmy of India's cattle will multiply unless their number can be first controlled and then reduced. Bold initatives are required, since agriculture remains the crux of the national development. In different parts of India, difference in conditions have required different kinds of adjustments in the holdings of cattle and buffaloes, and they have been taking place in varying degrees, irrespective of whether slaughter was permitted or not. All that legal prohibition did was to obscure these processes of adjustment and slow them down. The need for adjustments of this kind should be seen in the context of the nutritional requirements of the people, such as for milk and other forms of animal protein. The present Central Govt. and Planning Commission have bee laying great stress on rural development which will not be possible if our animal wealth is destroyed. In fact, the policy of constructing modern slaughter houses with a view to export more meat is in utter disregard of the avowed rural oriented policies of the Government. – *Dr. K. N. Raj in his convocation address at Univ. of Agriculture, Bangalore.*

Plant Based Energy Alternatives

The plant-based energy systems are better because they are not only renewable, but also help in checking environmental pollution. High density and short rotation biomass of fast and hardy species as of deciduous trees and shrubs, should, be raised on non-agricultural or marginal lands only to avoid competition with food crops. Agricultural alcohol which was a successful fuel in Brazil is not suitable for India as it is more economical to use it as an industrial feedstock. Simiarly, the vegetable oils is not a promising fuel for the diesel engines in India, because of shortage of vegetable oils and their higher price than petroleum. The new hydrocarbon plante like Guayule and Euphorbias, are hardy and most relevant to India as they could be grown in arid regions. The production of biological hydrogen deserves attention as it has long term potential. Marine biomass had remained neglected despite the fact that the sea formed 71 percent of the earth's crust. – *Dr. T.N. Khoshoo, Secretary, Deptt. Enviroument, in his lecture on 'Energy & plants' on World Environment Day (I.E., June 7)*

Burning Problem of Cooking Fuel : Annually, over 175 millian tonnes of wood are needed for fuel, four million tonnes for cremations and over one million cubic metres for making bullock carts. Besides over 25 million tonnes of precious agricultural waste like paddy husk, cow dung and castor sticks are burnt every year in lieu of firewood. Moreover, according to official figures, 22.8 per cent of the land area n the country is forest region, but it includes barren hills, narrowing. down the afforested areas to a mere 12 per cent. – *Dr. Y. M. L. Sharma, Consultant, International Forestry Consultancy Instti. Bangalore – reported in I. E. June 7*

Fewer Women Get Employed : The participation of women in gainful economic aotivity has declined steadily over the past two decades, mainly to the displacement of women by men in the total work force. The work force participation rate for women dropped from 28 per cent in 1961 to 14.2 per cent in 1971. It, however, rose to 21 per cent in 1981. The participation rate of the male has also declined, mainly because of faster growth of the male population than the rate of their absorbtion in the work force. Three factors which determine the changes in the work force participation rate (WRP) are displacement of the famale by the male in the total work force, effect of a change in tne employment level in the economy and the effect of change in the sex ratio in the population.

No Wood For Cooking : According to a FAO survey, seven geographical areas including mountainous areas of Northern India fall into the category "acute scarcity situations" with ragard to fuelwood supplies. The estimated level of needs is between 1.7 and 1.9 m^3/ inhabitant/ year while the estimated availability varies from 0. 05 to 0. 55 m^3/ inhabitant /year. If current trends continue, by the year 2000, the fuelwood availa bility will be reduced to less than 0. 3m^3/ inhabitant/ year and fuelwood will have completely disappeared in some areas. Punjab, West Bengal, Rajasthan and Gujarat fall into the penultimate worst category, of a "deficit situation", where, populatioons are still able to meet their minimum fuelwood need. only cutting in excess of sustainable supply.

ABOUT US

Centre of Science for Villages, Wardha is committed to taking benefits of Science from the threshold of labs to the doors of mud huts. A team of scientists, skilled artisans and village youth is striving to convert lab-techniques into rural trades in Housing and Environment, Energy and Fuel, Tools and Equipments and Non.traditional Crafts and Industries.

Dear Friends,

The monsoons have set on their pilgrimage from the western seas to the eastern land. With the million hands, they distribute bounties of lush greenery and 'life' for the entire living world. Each year, they come and go. And in most parts, the rich greenery and the very vital life force 'water' brought by them follow their suit. It is all dry and barren after three-four months. In thousands of villages, people, mostly women trod miles together to fetch a potful of water for drinking. Can we afford to allow this heavenly gift go waste ? Can't we store and preserve the rain water for use in the coming months ? It may not be a very difficult task. Atleast that is what GRET thinks. And they have proved it in Senegal, Upper Volta, Niger, Ivory Coast & Togo where the rainfall is meagre, as in most parts of India. GRET is our friend from overseas. A voluntary institute from France working mainly in the areas of *drinking water supply, conservation of water and soil, run-off agriculture, micro irrigation and organic farming*, they have chosen west Africa as the field for their experimentation. They have chosen us as their counter part for the experiments which they wish to conduct in India.

To begin with, they came to us to know what we are doing and to draw a plan of mutual co-operation & action. So in the last two months, we had with us *Dr. Pierre Martin, Mr. Mark Levy and Mr. Claude Aubert.* (Please see P. P. 6 & 7 for a technique of water purification developed by GRET in Africa, which, after suitable modification, will be tried out at CSV.) As second part, *Shri Avinash Rohankar*, the Architect & *Dr. Tarak Kate* the bio-scientist from CSV will visit France for about a month to understand the work carried out by GRET and to bring home the things which could be meaningful in the Indian context.

The pleasant showers of monsoons have not yet wiped the memory of hot summer days of scortching sun. However, in a few houses in Viderbha, the summer was not all that unpleasent this time. Thanks to the '*Rituraj thermostatic plaster*' developed by *Shri N. D. Pandharipande*, a close friend and a co-workers of CSV, Shri. Pandharipande won this year's *Ramabai Joshi Merit Award sponsored by Maratha Chamber of Commerce & Industries* for this invention. The thermostatic plaster made out of naturally occuring substances such as cow-dung, 'Jamun' bark etc. is available as a ceiling coat as well a wall paint and can provide temperature regulation upto 10^0-15^0F. Shri Pandharipande, a disciple of J.C. Kumarappa, has also developed a novel method of composting by means of which waste matter weighing as much as forty times the weight of cow-dung used can be converted into good quality compost manure in above – the – ground tanks – (SFV – May 1981). Shri Pandharipande runs a ready-made cloth shop-perhaps the only one being run entirely on the principle of trusteeship. Our congratulations to NADEPKAKA (as he is affectionatly refered to) for winning the award.

Lastly, an appeal - Please send us subscriptions [Rs.15/-per year for individuals and Rs. 25/- per year for institutions], addresses of potential subscribers, advertisements [Rs. 1000 /page, Rs. 500 / half page, Rs. 300 /quarter page], articles & suggestions for our sister publication – GRAMOPAYOGI VIGYAN scheduled to de published from Aug. 15,1982.

-RAVINDRA-

HOW YOU CAN HELP US-

- ☆ **Send for publication your experiments and experiences or information in rural technology you come across.**
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- ☆ **Solicit appropriate advertisements to help financing this publication [Rs. 1000 for full Page, Rs.500 for half and Rs. 250 for quarter page per insertion].**

please write to : **The Editor, Science for Villages, Magan Sangrahalaya, Wardha- 442001, [M.S.] INDIA.**

Cover pages printed on Hand Made paper made paper from Banana Fibre at C.S.V., Wardha : printed and publishedby Devendra Kumar on behalf of Science for Villages, Wardha, Managing Editor : Ravindra, Chief Editor : Devendra Kumar, Editorial Office : Centre of Science for Villages, Magan Sangrahalaya, Wardha. Printed at Paramdham Printing Press, Paunar (Wardha). **Regd. No. WDA–119**

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Three Grave Dangers

In the Independence Day speech on Aug. 15, Prime Minister Indira Gandhi rightly listed the following three as the gravest dangers to mankind, in general and India, in particular : (i) the suicidal arms race, (ii) growing disparities between the rich and the poor and (iii) attempt by some nations to control non-renewable natural resources and their indiscriminate plunder.

The arms race is gradually taking up larger and larger share in human productivity in all countries including ours. In Research and Development also its share is the biggest. This is due to the competitive world economy where both for raw materials as well as finished goods, each country struggles against its neighbouring and other competitive peers. This competition could be minimised if there is a planned world economy where external trade is adjusted on the principle of regional self-sufficiency. Goods which are needed more in quantity and frequency, will have a smaller circle of self sufficiency and be procured in a closer area than those required in lesser quantities for lesser number of times which could have a circle of a larger radius. The world trade then will be on the basis of varying circles of self-sufficiency for different commodities – the lesser the degree of urgency, the bigger the radius of its circle and vice versa. This Gandhian principle has the key to avoidance of the Arms Race which basically emanates from economic compulsions of a world getting progressively competitive and thus exhibiting self destructive propansities. Our own country's efforts to get rid of the unhealthy exploitation of the weak by the strong would be more successful if this mode could be followed. Arms Race, a sign of insecurity and aggression has to be removed by its very root. In the changed economy of peace, Science & Technology will also have a different mould.

The growing disparity between the rich and the poor, the urban and the rural, the North and the South is augmented by the kind of means of production adopted. Productivity through capital intensive centralised units with sophisticated high level technology can be afforded only by the affluent countries and entrepreneurs. The benefits that accrue from such enterprises are not equitably distributed. Even in the case of agriculture that depends on high investment as in the case of high yielding varieties of hybrid crops requiring greater nutrients, pesticides and insecticides, the gains of greater production have gone to the prosperous among the farmers. Thus, in all fields of production, apart from productivity increases, the aspect of social justice must also be closely monitered. We, in our country will have to safeguard industries of the rural poor against those with heavy capital and bring about new techniques that could be taken up by the landless villagers and other weaker sections of the people utilizing modern principles, yet which are simple and cheap enough for their level. A new stress on such technologies needs to be given.

Non-renewable natural resources are basically the ancestral properties which need be passed on intact to the generations to come. If these are encashed for the present prosperity, we will be cheating in 'time' in the same way as imperialism does in 'space' by misappropriating the share of other countries. Unless the comity of nations comes to an agreement that the mineral resources of earth, which are non-renewable, belong neither to the generation which discovers them nor to the nation-state where they may be lying buried. It should not take long to understand that as the treasure-trove that an individual may find in his courtyard is not his, but of the State, so also the minerals, in the making of which a nation has no contribution and which is a part of the earth's heritage kept at random in its various pockets, belongs to the world community. Planning and control of these resources must not be left to the nation of their origin. The particular nation where the coal, petrol, iron, tin or other minerals are found, is a trustee of these resources and its extraction, sale and utilization must be managed under the direction of an international body which takes into view the long range interests of the world and its various nation states. This is an area where enough thought has not been given

In a sense, the above three grave dangers are interrelated. The arms race emanates from causes of growing disparity and the competition for control of non renewable resources of the earth. Thus, we will have to act on the three fronts simultaneously.

Virendra Kumar

VoL. V, No. 12

Sept. 1982

from the labs

In this column, we invite techniques evolved in the labs of India as can benefit the villages and help in creating a new order.

Kuttanad Barrier Poses Hazards : The life of inhabitants of Kuttanad, the rice bowl of Kerala, has become "unbearable" following the far reaching changes in the ecosystem caused by the construction of the Thannermukkam salt-water barrier. The barrier was built in 1976 to facilitate double cropping and to prevent the saline water intrusion in paddy fields. However, the accumulation of water led to the following implications– The mosquitoes bred rapidly and diseases like diarhoea, dysentery, gastroenteritis, jaundice, typhoid, worm infections and filariasis had increased. Asthma, scabies and anemia were also found to be common. Water in the lake and wells turned more viscious and distasteful. The fertiliser and pesticides residues drained from paddy fields led to an uniterrupted growth of aquatic weeds like Salvinia and water hyacinth blocking the waterways & reducing oxygen level in the water and causing destruction of fish and other acquatic life affecting the employment of fisherman. Due to excess Nitrogen in water, the Nitrite derived from Nitrates had affected haemoglobin in the bottlefed children's blood. In some cases, it had caused oxygen starvation leading to the growth of metahaemoglobimaenia (blue babies). The de-salinated water had affected the coir industry as it hit fibre setting so that even without the Thannermukkam barrier, it was possible to raise two crops of paddy in kuttanad.

— *Findings of the study made by Dr. R. Gopalkrishnan, Centre for Water Resources Development & Managemeht.*

Machine Compacted Bricks : The civil engineering students of *Alagappa Chettiar College of Engineering & Technology, Karaikudi, TamilNadu* have evolved suitable mechanical-cum-manual techniques for improving the performance of sundried bricks. A machine is fabricated to apply a load of about 500 kg. to compress the soil. It prepares two bricks at a time, in about two minutes. The strength of machine compacted bricks is two to six times that of sundried bricks. The maximum strength is obtained at 12 to 16 percent water content which worked out to about 2 to 3 per cent higher than proctor optimum. The maximum strength was obtained when the percentage of silt and clay was in the range of 5 to 10 per cent. Preparation of compact bricks is a labour-intensive process. Such bricks have good heat and sound insulation properties. The estimate cost of these bricks is about Rs. 80 per thousand, including the transport charges.

Pedal Pump : A pedal operated pump developed at *the Central Mechanical Engineering Research Institute (CMERI) Mahatma Gandhi Avenue, Durgapur.* Irrigates a field at an average rate of 6,000 litres/hr. at a head of 2–3 metres, depending on the operator's capacity and cleanliness of water. It can easily handle muddy water and is especially suitable for places were water is available almost at the surface level in irrigation canals, streams, shallow wells, ponds etc. The pedal pump is operated by a single person, standing on the foot-pedal and shifting his weight from one foot to the other like a seesaw. This movement causes diaphragm of the pump to be pulled alternately, creating suction in one of the two chambers of the pump for lifting water. Since the discharge of water takes place twice in each cycle of operation, a continuous flow of water is ensured. The rate of discharge depends on the body weight and the efforts exerted by the operator. Its trials have evoked good response from the rural people. *(A. T. Dotu, Bull. Vol. VIII, No. 1)*

New Herbal Drug : For the last five decades, apart from the discovery of Rouwolfia in late forties, no further Ayurvedic drug emerged as a scientifically proven therapeutic agent. *Regional Research Laboratory Jammu* has now broken the ice by discovering properties of Salai Guggal (gum resin of *Boswellia serrata*). It has been put on the market under the brand name SALLAKI. It is highly effective in the treatment of rheumatoid arthritis, osteoarthritis, juvenile rheumatoid athritis, soft tissue rheumatism, low back pain, myositis, and fibrositis.

(Contd on Page 10)

DRYLAND FARMING

The myth of food self suffeciency came unstuck when the country had to import about two million tonnes of wheat this year to bring up the fast declining buffer stock. The grain availability per capita has been bad at the best of times. And it is falling even as production is rising. The Central Statistical Organisation (CSO) figures indicate that from 480.2 grams per capita foodgrain availability in 1965, it has fallen to 413.7 grams in 1980 when production touched a new hight at 133 million tonnes. The monsoon factor in food strategy continues to be dominant in spite of the fact that the country's irrigation potential has increased from 22.6 million hectares in 1950-51 to 56.6 million hectares in 1979-80. The tremendous growth of 154 per cent over a period of thirty years was achieved after the investment of the massive sum of Rs. 9,023 crore since the first five year plan launched in 1951. This thrust has been carried forward in the sixth plan which provides for Rs. 8,148.36 crore for various irrigation projects. The massive investment in various projects has made possible the irrigation of only 30 million hectares. It seems a plateau has been reached with investment yielding diminishing returns. The fall in the consumption of fertiliser and the inability of the farmer to return loans points to the end of the Green Revolution. A mini-exodus has set in again from the villages to city centres. Farming having become unprofitable, the rural "elite" who brought about the Green Revolution by switching over to new methods, are seen queuing up outside employment exchanges.

The only way out is to review the food production strategy and switch over to dryland farming which is the only immediate method to substantially raised the output and close the food gap. Production in dryland has increased by more than 300 per cent where the full technology package has been adopted. However, the total output on these lands contribute only about 40 per cent to the food basket. The reason is the uneven spread of technology in most regions where farmers still depend on the traditional methods and invoke the rain god who seldom obliges them. Dryland farming, is done on 74 percent of the total 142 million hectares under cultivation accounts for only 60 million tonnes of foodgrain produced in the best conditions. Since not much can be done to "discipline" rains. ICAR scientists have tailored the technology to suite its eccentricities. All is set to meet the food shortfall – priorities are identified and 23 research centres and 24 pilot projects, spread all over the country in different agro-climatic zones, have been geared to raise dryland food production from the present 60 million tonnes to 150 million tonnes by 1985. Dryland farming will also increase the income of the 80 per cent farmers who depend on it

Since dryland farmers are inevitably poor, the use of costly inputs is limited by their inability to buy them. Operating under such constraints, dryland farmers have to be "synthesised into the integrated whole" and a community approach has to be adopted to solve the problems of hunger. Dryland technology consists of water budgeting. Run-off water is stored in catchment are as and utilised for irrigation and for increasing cropping intensity during the rainy season. A better "in-situ" water conservation system combined with good crop management minimises the risk as the water can be transferred from the period of excess rainfall to times of stress. Scientists have perfected this technology almost to the last detail. Dryland crops of short duration and high yielding varieties have been developed with maturing period of 20 weeks to ensurs their harvest before the withdrawal of the monsoon. Through the inter-cropping and double-cropping system, an optimum yield can be obtained for which location specific technology and crops have been developed by scientists of the Hyderabad institute. Crops suitable for dryland farming are mainly shorghum, pulses of different varieties, pearl millet, groundnut chick-pea, maize, rape seed, rice, barley and wheat. Scientists have prescribed a "drought code" to stabilise production under stress conditions caused by a delayed monsoon, long breaks or an inadequate quantum of rain. In these situations, anticipatory measures are better than palliative ones to reduce damage. The package of practices– improved seed varieties, timely sowing, judicious use of fertilisers and constant monitoring. The cost of irrigating one hectare of land through river valley projects comes to around Rs. 20,000. If the Govt. spends only Rs. 2,000 per acre on dryland technology, the yield will be as good as on irrigated land.

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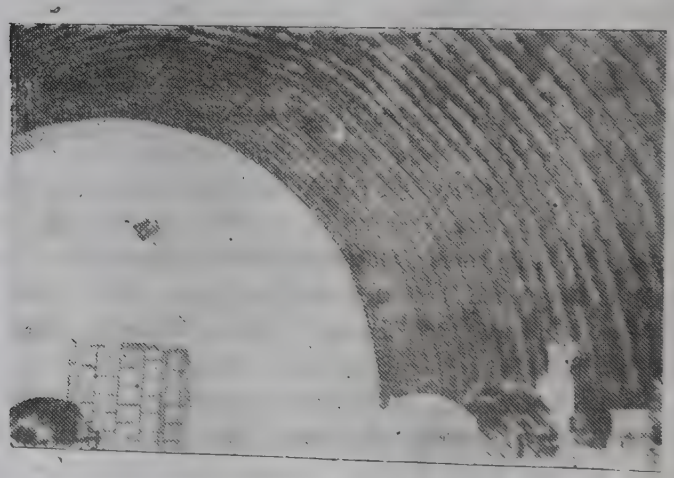
Conical Tile Roof Shed

The conical tile roof shed is an outcome of series of experiments in the direction of devising a cheap and durable roof. With rising cost of the under-structure, bamboo and wooden planks which are the basic elements of a roof, a cheap roof ment doing without the under structure. A combined effort of our pottery and construction unit is this cheap house you see in the picture (above). With a team of one meson and four helpers it took us 20 days to complete this shed of 10'×15' size at the construction cost of Rs. 3,300 /- (Rs. 22 per sq. feet).

Apart from its low cost it has many other salient features to make it the talk of the town. To mention a few it is proof against dampness, fire, rats, verimins: reduces temperature radiations; needs no repairs; easy to clean; looks strong and beautiful; made with the local material and with the help of local skills.

Roof without understructure : The conical tiles (size– 8" –length, 4" bottom diameter, 2.5"– top diameter) are shaped in a form that they fit into each other forming a semi-circular arch. A complete arch ring consisting of 38 concial tiles, is rested on the cross wall with an under support of wooden centering (which is later removed). Each circular tile ring is joined and gaps filled with lime pozzolana mortar (1:3), 40 semi circular rings complete the roof. The top of the roof is plastered with $\frac{1}{2}$" thick L. P. mortar, total roof thickness is 5". Inside plastering can also be done.



Internal portion of the roof

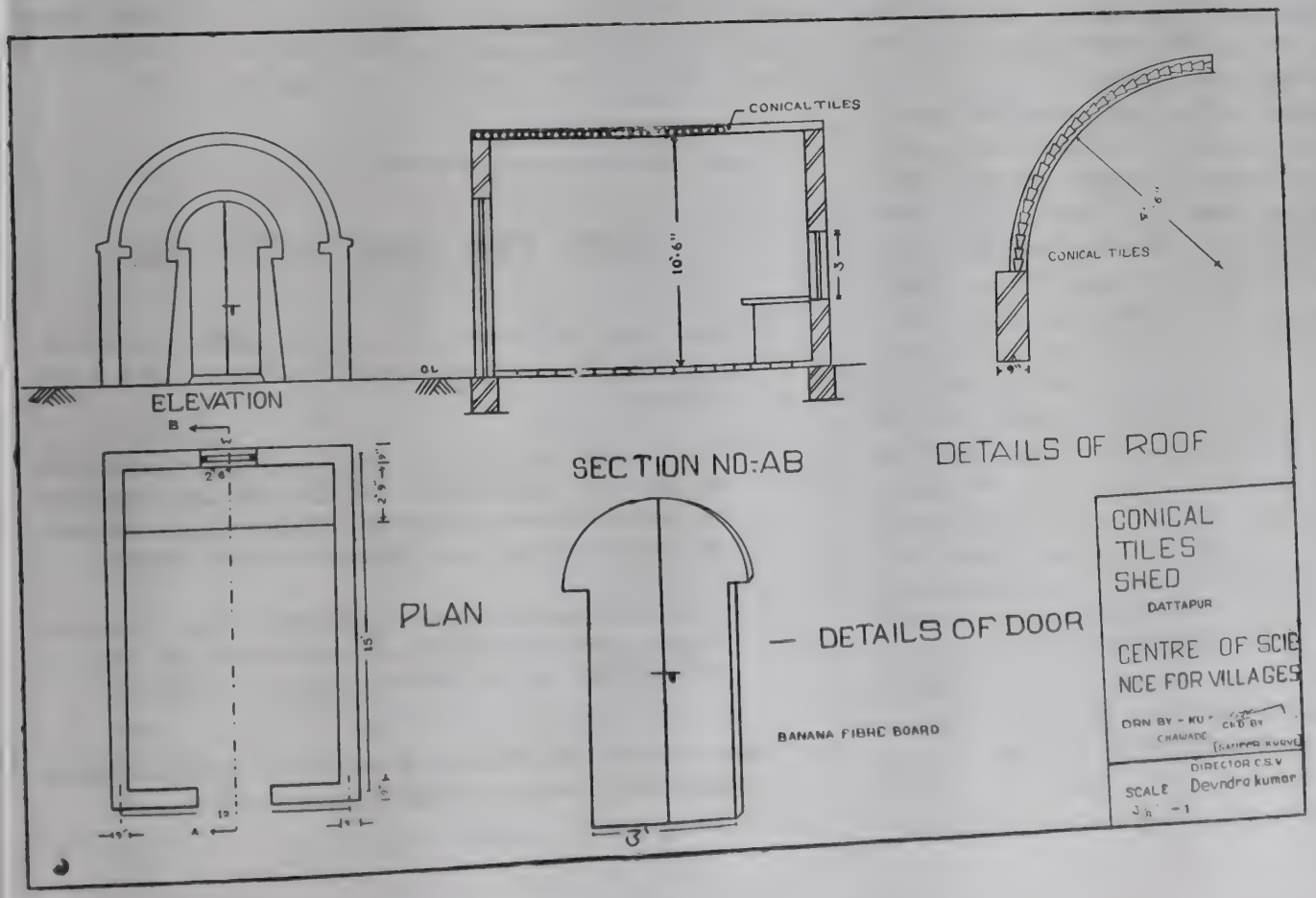
COST REDUCINC FACTORS

1. Due to the semi-circular arch shape of the roof one can do with less wall height (maintaining the overall 12 ft. room height) thus economising on the bricks. The light roof structure rests on the wall built in mud mortar with lime pozzolana plastering.

2. Door and window without frame, with Bitumen treated thick Banana fibre boards screwed on the shutter is a considerable saving on the wood, costing Rs. 125/- per door, that is one third the cost of ordinary door.

3. Flooring done with burned clay tiles, costing Rs. 2/- per sq. feet, thus reducing the cost by two third the cost of stone flooring.

4. No tree or bamboo is cut to make the roof. For constructing an understructure of '10×15' size roof, one needs 10 ballies (wooden beams) and 10 bamboos which are no more needed.



Material Used

Bricks	–	4,000 (No.)
Lime Pozzolana	–	24 Bags
Sand	–	100 Cft.
Conical Tiles	–	1,800 (No.)
(Wooden Centering For 150 Sq. Feet)		

Contact:-

Centre of Science for Villages, Magan Sangrahalaya, Wardha 442001.

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please write to : The Editor, Science for Villages, Magan Sangrahalaya, Wardha. 442001; (M. S.) INDIA.

WINDOW TO THE WORLD

Science for Villages is not an isolated effort. It is a part of a world-wide movement of A. T. Here is an account of the ideas and activities of the birds of the same feathers from overseas

Low Cost Stencil Duplicator : 'Lipikar' a low cost stencil duplicator developed in Bangladesh is fabricated out of locally available materials and can be produced for a fraction of the cost of an equivalent imported machine. It can be constructed in any modest workshop Invented by Dr. Salahuddin 'the Lipikar' was identified and helped by the ITDG's Intermediate Technology Industrial Services (ITIS). It has only ten components, is easy to maintain and needs minimal training to operate. Two versions have been developed: the origional wooden and a heavy-duty metal covered model. It can be used with any type of ink or stencil and most grades of paper, a versatility not found in more expensive machines. In Bangladesh, the cost is 15–30 pounds. (For further information, contact : ITIS, Myson House, Railway Terrace, Rugby, England.)

Biogas In China : There are seven million biogas plants in China enabling the country to put nightsoil and waste material to good use. Each biogas plant costs about Rs. 600 and every house is provided with a latrine. Every Chinese school child is taught about environmental cleanliness. Moreover, there is a 'patriotic health movement' under which an offender is corrected through public criticism China has been suffering air pollution because of thermal power stations, but appropriate measures are being taken to prevent it. The director or manager of plant is held personally responsible for violation of anti-pollution laws. Information fernished by the delegation of Chinese scientists working on Biogas Which toured India recently.

Fule From Domestic Waste : A waste conversion system, which can convert waste to fuel pellets containing 65 per cent of the energy of a corresp onding quantity of coal, is being marketed in Sweden. The 'Brini' pellets have a low sulphur content and can be used in existing industrial solidfuel boilers. A fullscape commercial plant with an annual capacity of 25–30,000 tonnes of waste is now under construction in Kovik by the Swedish firm PIM. Many simlar plant are under construction in different cities. The Brini system is considered to be an economical alternative to conventional incinerators and composting plants. The system allows for a considerable reduction in dump capacity requirements.

Crop Losses From Ozone Damage : costs the United States from 1.9 to 4.5 billion U. S. dollars a year, according to the first national survey of ozone damage, conducted by the National Crop Loss Assessment Network (NCLAN). However, Congressmen George Brown noted that the results of the survey are conservative and underestimate total crop losses to air pollution. The survey covered only four major crops corn, wheat, soyabeans and peanuts–and did not review effects of air pollution other than ozone such as acid rain. For example, total crop losses in California alone are estimated to run about 1 billion U. S. dollars per year. (Environment, March 82)

Pedal Power : The "milkshaw" is a new kind of rickshaw. It is painted white, pedal-powered, three-wheeled vehicle equipped with a large insulated carrier box, Its job is to speed up the distribution of fresh milk supplies in Dacca, where milk spoil rapidly in the year round due to heat. About 100 milkshaws are now in operation–each with a carrying capacity of 250 litres of milk in sachets. Manoeuvreable and economical, they are locally built, thus providing work for local artisans. Each costs about 400 U. S. dollars, – a fraction of the price of an imported, insulated delivery truck. This improved model uses jute a major product of Bangladesh, for part of the insulation. (IDRC Feature)

Orange Blossoms Again And Again : An orange tree which blossome thre times a year March, June & December has been bred in China. Thus the tree has fruits on its branches virtually all year ronud. The average weight of it is 220 grams each, and the tree's yearly yield is one-and-half time that of ordinary orange trees, In 1963, fruit growers in Baoshan county, in southwest China, grafted cuttings of a new variety from neighbouring Sichuan province onto local rootstocks. They were reportedly amazed to find one of the resulting trees bearing fruit three times each year. Scientists from the Citrus Institute of the Chinese Academy of Agricultural Science have studied the new trees, and declared them to be the result of a "genetic Mutation".

Making The Most of Waste : Straw treated with caustic soda mixed with urea and mineral solution can produce high quality feed at low cost. Oat straw makes the best feed, but straw from wheat and other crops can also be used. (Dr. Roy Kellaway, University of Sydney, Animal Husbandry Department.) □ □

BOOK WATCHING

Revolt from the Center : *By Niels Meyer, Helveg Petersen and Villy Sorenesen (Marion Boyars, 18 Brewer St., London WIR 4 AS; or, 99 Main St., Salem, NH 03079, USA; 14 U. S. dollars).* The book logically follows the decline of the current Western Culture, the foundations for the coming change, gives an Utopian view of what could develop, and suggests steps we should take today to make it happen. Its theme is that the political and economic center is being squeezed between left and right A new system neither Marxist nor Capitalist is being developed. A new democratic ideology will recognize that over consumption is no substitute for the real needs. A new system will give each person the right and means for making his own decisions. This means decentralizing both governmental and industrial activities and giving all people a voice in smaller units.

Vol. 8 No. 2 of "Science & Public Policy" *reporting the debate among science policy experts on the OECD report "Science Policy in the new socio-economic context.* The paradigms of the dying age confined the report and the discussion to "Science leads to technology, technology leads to growth, and growth is good." Only in Emma Rothschild's critical annex to the Report and Maurice Goldsmith's defence of her position do we see the beginning of a new dialogue on the purpose of meaning of science and technology. The definition and defence of science policies on the basis of growth economics, military strength, and materialism is inadequate to todays problems. There is a need for a New Age science policy in terms of global consciousness, economic equity, human rights and the search for spiritual fulfilment.

Some Performance Tests on open fires and the family Cooker : A report from the woodburning Stove Group. Departments of Applied Physics and Mechanical Engineering, Technical University of Endhoven and Division of Technology for Society, TNO, Apeldoorn, The Netherlands, June 1980, edited by K. Krishna Prasad Copy available from– *The Woodburning Stove Group, Deptt. of Mechanical Engineering W & S, Technische Hogeschool Eindhoven, Posthus, 513, 5600 MB Eindhoven, The Netherlands.* The report is one of the very few scientific works done in the important but neglected field of wood burning stove – the only cooking system that poor people can afford. It provides results on open fire and determination of parameters involved in determining its efficiency. It also covers the investigation of problems and prospects of constructing reliable heat balances in some new designs–the Family Cooker, to pinpoint the strengths and weaknesses of the modern efforts, to improve the traditional method.

A study of the performance of two metal stoves : Editor and Publisher as above. The second report from wood-burning Stove Group deals with the efficiency of the 'Family Cooker' (described in the earlier report) and 'De Lepeleire /Van Daele Stove' using efficiency obtained from conventional water boiling tests as the performance indicator. It is a laboratory study and what it has achieved is to set the limits of performance that can be realised from these designs and to provide a guideline for new designs. An important feature of the present work is the development of a methodology of forced operation of fire. □

(Continued from page No. 2)

Construction equipments for rural roads : *The Central Road Research Institute, New- Delhi-* has developed a new design of animal-drawn road-rollers with total weight of about 1100 kg. which can be towed by a pair of bullocks. Their compacting efficiency is comparable to that of 8 tonne conventional road rollers, though more number of passes are required to achieve the desired compaction. The cost of these rollers is about Rs. 3,000 /– while that of a conventional road roller is over Rs. 1,00,000 /–. These rollers can be fabricated and maintained at the village level. Water sprinklers costing Rs. 1300 /– have been developed for rural road construction by mounting 6 used drums with total water capacity of 1200 litres on the bullock-carts and water is allowed to flow under gravity through perforated pipes. For intimate mixing of different ingredients of a road layer, a mechanical mixing device has been developed which can be operated through a tractor. Efforts are being made to develop such a device operated by bullocks. The cost of the tractor-driven mechanical device is about Rs 15,000 /–.

□

NEWS & VIEWS

Technology Appropriate For India : There should be greater emphasis on development of non-farm technologies so that absorption of ever increasing unemployed work force of rural areas finds gainful employment in secondary and tertiary sectors, but in a manner so as to complement and supplement the land-based technologies. In addition to the above, there is a need for introduction of non-traditional farm technologies which meet one or more of the following criteria : (1) Higher economic returns per unit land area. (2) Provide a renewable source of energy through cultivation of energy efficient crops e. g. subabul, sunflower etc. (3) Dependence on little or no-use of irrigation, (4) Can support a family on a small track of land (one acre or less) e. g. biodynamic system. Priority should be given to generation of such technologies, which will be of the 'multiplier effect'; Seasonal and part time technology relating to mitigation of calamities that usually befall village communities e. g. fires, floods, cyclones, droughts etc, should be promoted. *—Recommendations of the National Seminar of Rural Technology held at Institute of Engineering & Rural Technology at Allahabad.*

Salt Gradient Energy Latest Energy Source : Salinity difference between river water and sea water can be exploited to generate enormous amount of electricity. Thus a power station can be set up at the mouth of every river that falls into the sea. As the river mixes with the sea, the salinity gradient creates a pressure difference which can support a column of water. This water can be passed through a turbine to generate power. The total run off and stream flow of the world that reaches the oceans could theoretically provide 2.5 million megawatts or about one-tenth of the global power needs. Salinity power can become a major source of energy in India which has numerous rivers falling into sea. Besides the rivers' the 'salt domes' located adjacent to the sea are potential sources of energy. Salt could be pumped from the domes in dissolved form and mixed with the less saline sea water producing enormous pressure difference. A typical salt dome can provide 28,000 M. W. of energy per year *Shri V. Keseva Das, National Institute of Oceanography, Science Reporter.*

Training In Biogas : During AFPRO' S Bio-gas training programme from January '80 to May '82, AFPRO technicians trained 295 rural masons sponsored by 130 organisations and constructed 118 bio-gas plants of varying sizes in 18 States and Union Territories. The 3-week training courses were conducted in cooperation with 48 institutions /organisations Some of these organisations are now training masons in collaboration with state governments independent of AFPRO support, while some have made modifications and innovations in the plants. *(News Notes from Action For Food Production)*

Security Hazards of Threshers : Farm labour have had to pay dearly with life and limb for farm machinization in many parts of the country. More than 10,000 people working on threshers have been incapacited for life by the machines chopping off their hands. In Punjab alone on an average, 500 workers meet with thresher accidents each year and a few of these prove fatal. *(Dr. S. R. Varma and Mr. B. S. Bhatra, Farm Power & Machinery Experts, P. A. U, Ludhiana.)*

30 Windmills In Maharashtra : A windmill was installed at Aarey Milk Colony on June 18 under the *National Demonstration Programme On Windmills* initiated by the *Commission for Additional Sources of Energy (CASE)*, of the DST. In all 30 windmills were proposed to be installed at different state government sites in Maharashtra by June 30. The programme at the State level is being co-ordinated by the Science and Technology Cell in the Education and Employment Department. Under the present programme the windmill is used for pumping water and is being implemented by the *National Wind Energy R & D Centre, Institute of Engineering and Rural Technology, Allahabad.* The windmill costing Rs. 10,000 /- is provided by the Commission while the user agency will complete the foundation work at a cost of about Rs. 5,000. The maintenance of the windmill will be the responsibility of the user agency. ⊡

ABOUT US

Centre of Science for villages, Wardha is committed to taking benefits of Science from the thresholds of labs to the doors of mud huts. A team of scientists, skilled artisans and village youth is striving to convert lab-techniques into rural trades in Housing and Environment, Energy and Fuel, Tools and Equipments and Non traditional Crafts and Industries.

Dear friends,

It had been a month of 'external affairs' bringing to us the information of activities of our like-minded brothers & sisters from abroad. Last fortnight, Mr. Bruffaerts Jean Claude, a mechanical engineer from 'CEPAZE'- an A. T. institute of France delivered a lecture on 'Worldwide Efforts for Craftsmen'. He gave us an account of the worldwide movement for promotion of self-employment through small scale industries in harmony with nature. He also described a few techniques tried out by him and which may be of use here. They were- extraction of edible oils from Shea fruit using solar and animal power, a biogas plant with fibrocement (cement + sand + Sesal fibres), vertical axis windmill and bullock driven flour mill. We also listened to the lively talk of two of our colleagues, Dr. Tarak Kate & Shri Avinash Rohankar who recently returned from their 1½ month tour of France. A friendly institution GRET had arranged for their visits to A. T. centres in France. Their areas of interest were biogas, biodynamic farming, organic farming & low cost housing. They also represented CSV in an International Seminar on 'Technology & Development' at Puricardo village near Marseilles. They feel that a few techniques like large roofing tiles, thick vegetable thatch, mud brick making machine and those used for increasing the efficiency of biogas plants could be tried out & tested at CSV. We hope to gain much from the contacts established & information gathered by them in their tour.

My heart is filled with mixed feelings as I write the concluding part of this letter– the last one in the fifth year of existence of S. F. V. It is also my last letter to you as the Managing Editor of this magazine.

On one hand, there is a satisfaction of being able to give something useful and readables to our reader against heavy odds. Those of you who are in a similar position can very well imagine the hardships in regularly bringing out something of this kind on a shoe-string budget, from a small place with scarce printing facilities. Now that the process of making adequate printing arrangement of this magazine from Wardha are nearing completion, we hope to give you SFV in a more presentable form. (We sincerely regret the grave, although almost unavoidable printing mistakes committed in the last two issues.) The type will also be much better. We now have a clearer idea of what our diverse readership wants from us. (Thank you very much for your response to the questionnaire!) This moment, my brain is teeming with ideas of giving you the best possible material on A. T.- techniques, events, people, problems- with equally good presentation. It is indeed unfortunate that at this very hour, I have to bid you a good bye.

I am really grateful for the affection & encouragement received from you during the past one year. I hope that you will continue to cooperate with SFV through more sharp criticism, constructive suggestions and by providing more and better material for publication. Please remember that only an enlighted & vocal readership can shape S. F. V. into an effective organ of a broad-based movement for rural technology and prevent it from being another amorphous compendium of information.

Although I am relieving myself from the formal responsibilities concerning SFV, it is needless to add that I shall continue to associated myself with it. Apart from my teaching job at a Pharmacy College in Bombay, A. T. activities will form an important and integral part of the days ahead of me. for those who wish to write to me, here is my new address. With best wishes to SFV & to you all,

Ravindra R. P.
S 2/11, Shri Dwarka dhish,
Bangurnagar, Goregaon (W)
Bombay - 400090.

Yours sincer
RAVIND

Cover pages printed on Hand Made Paper made from Banana fibre at C. S. V., Wardha : printed and published by Devendra Kumar on behalf of Science for Villages, Wardha, Managing Editor : Ravindra, Chief Editor : Devendra Kumar, Editorial Office : Centre of Science for Villages, Magan Sangrahalaya, Wardha, 442001. Printed at Samyayoga Printing Press, Wardha.